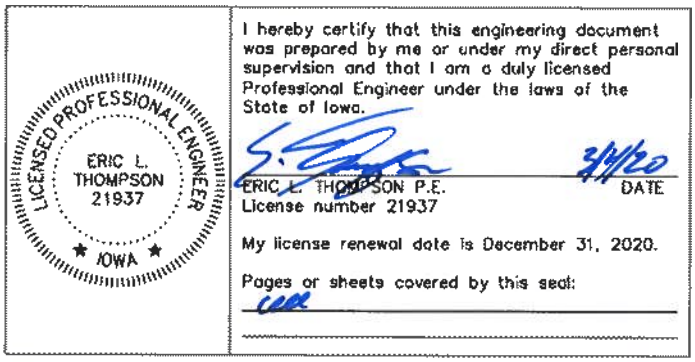
Stormwater Management Plan

Dotson Farms Subdivision

Story County Iowa

FOX PN: 5470-18A

March 4, 2020



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Site Characteristics

A. Pre-Development Conditions

The existing site is currently in a mix of agricultural use conditions. A large portion of the site is in meadow and located in the floodplain. The floodplain and associated meadow will be undisturbed. The total site area is approximately 160 acres. A NRCS soil survey returned a predominantly B soil type. For the purpose of estimating site runoff, the B hydrologic soil group will be used.

Per the Story County Code 88.05, the site was reviewed, and the allowed discharge was determined to be the existing condition, (row crop agriculture cover, contoured in good condition), limited to the existing 5-yr release rate. This was a result of the 100-yr meadow condition found to have a higher site discharge than the 5-yr existing release rate. Therefore, the more restrictive rate was selected. For HSG B, the CN for the site will be **75** to establish allowed runoff.

There is also adjacent runoff from approximately 614 acres of agricultural land, CN 75, that will be bypassed, as overland flow, at the existing rates.

B. Post-Developed Conditions

The proposed site will be developed as a rural residential conservation subdivision. The proposed site will have a composite CN value of 66. This will be accomplished by preserving existing natural resources, minimizing pavement, and restoring the majority of the site to meadow. This plan is consistent with low impact development guidelines.

Proposed drainage patterns for the site will be similar to the existing conditions. The post-developed runoff will be managed through dry detention ponds located throughout the site. The storm water management design is outlined in section 4.

C. Contributing off-site flows

There are 3 off-site areas analyzed in the report. The basins were routed to account for restrictions offsite, this included culvers at 170th, and field depressions which create storage volume.

D. Floodplains, Floodways, and Wetlands

According the Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) provided by FEMA, the proposed project site is located within the floodway. Additionally, there is no evidence of wetlands within the disturbed project limits.

E. Pre-development Runoff

1. Watershed Area
   Stormwater currently leaves the site as overland flow south to Squaw Creek. Refer to section 7, Map Appendix, for F.01 - Existing Conditions.

2. Time of Concentration
   The NRCS Lag method was used to determine time of concentration for this project. Refer to Section 8 for the time of concentration calculations.

   a. Small areas were limited to a minimum time of 10 minutes.

3. Precipitation Model
   The precipitation model used for this project was the rainfall Intensity-Duration-Frequency (IDF) curves, based on historic rainfall data for central Iowa, Region 5. IDF curve data was entered into Hydraflow software for hydraulic calculations.

4. Rainfall Loss Method
   SCS Curve Numbers (CN) were utilized to account for infiltration and rainfall loss. CN values were determined from Section 2C-5, Table 2 of the Iowa Stormwater Management Manual. To establish a pre-developed runoff rate, a CN value of 75 was used for an existing condition of row crops contoured in good condition. The 56.16 acres of undisturbed meadow was excluded from the site runoff analysis. The developed on-site area analyzed totals **103.48** acres. The CN value assumes hydrologic soil group B. Refer to Section 8 for calculations.

5. Runoff Model
   Runoff discharges for a range of storm events were calculated using Hydraflow software with the SCS Method for peak flows. Calculations are included in the Appendix. The calculated runoffs were used to establish the pre-development release rate from the site. To insure that proposed development will not cause a downstream detriment, the proposed release rate will not exceed the pre-development condition.

6. Summary of Pre-Development Runoff
   The release rate for pre-development condition, on-site, at the 5-year rate was calculated to be **82.44 cfs**. Total discharge from the site, is tabulated as follows:

Table 1.1 – Pre-Development Release Rates

		Duration	*SCS*	*1-year*	*5-year*	*100-year*
		24hr	**CN value**	**2.67**	**3.81**	**7.12**
Location	**Area (AC)**	**TC (min)**	**Composite**	**Q1 (cfs)**	**Q5 (cfs)**	**Q100 (cfs)**
EXISTING BASIN A	17.23	79	**75**	6.68	14.82	42.94
EXISTING BASIN B	40.42	74	**75**	16.44	36.45	105.59
EXISTING BASIN C	16.06	58	**75**	7.19	15.90	45.88
EXISTING BASIN D	6.58	26	**75**	4.84	10.47	29.96
EXISTING BASIN E	1.85	6	**75**	2.34	4.80	13.13
OFF-SITE B (ROUTED)	602.98		**75**	48	85.57	185.35
Off-Site BASIN C 1	2.66	20	**75**	2.144	4.601	13.13
Off-Site BASIN C 2	8.14	36	**75**	4.35	9.54	27.45
			Total Release	**91.98**	**182.15**	**463.43**

Table 1.2 – Allowed Release Rates, with offsite by-pass

		Duration	*SCS*	*1-year*	*5-year*	*100-year*
		24hr	**CN value**	**2.67**	**3.81**	**7.12**
Location	**Area (AC)**	**TC (min)**	**Composite**	**Q1 (cfs)**	**Q5 (cfs)**	**Q100 (cfs)**
On-Site Allowed Release	82.14	n/a	**75**	37.49	82.44	82.44
Off-site Bypass	613.79	n/a	**75**	54.49	99.71	225.93
			Existing Release	**91.98**	**182.15**	**308.37**

Post-Development Runoff Analysis

A. Watershed Area

The proposed site utilizes low impact development features such as, restoration of green space areas, preservation of existing meadow and wetlands within the floodplain, use of native vegetation into the landscaping plan, and preservation of native trees. Storm Water will be discharged from the site at three outfall locations. Generally, all the discharge from the site will be held in the dry detention basins and release at rates no greater than the existing 5-yr rate. Refer to Section 7 for the Post-Development Drainage Map.

B. Time of Concentration

The NRCS Lag method was used to determine time of concentration for this project. Refer to Section 8 for the time of concentration calculations.

a. Small areas were limited to a minimum time of 10 minutes.

C. Precipitation Model

The precipitation model used for post-development is the same as outlined in Section 1 for the existing site. The precipitation model used for this project was the rainfall Intensity-Duration-Frequency (IDF) curves, based on historic rainfall data for central Iowa, Region 5. IDF curve data was entered into Hydraflow software for hydraulic calculations.

D. Rainfall Loss Method

The rainfall loss method used for post-development is the same as outlined in Section 1 for the existing site. SCS Curve Numbers (CN) were utilized to account for infiltration and rainfall loss. CN values were determined from Section 2C-5, Table 2 of the Iowa Stormwater Management Manual. Generally, the site is composed of impervious area and green space. The post-developed site (160 ac) was determined to have a composite Curve Number value of approximately 63. The area to be developed will have a CN of 70, and areas returned to meadow will be 58. Refer to Section 8 for calculations.

E. Runoff Model

Runoff discharges for a range of storm events were calculated using Hydraflow software with the SCS Method for peak flows. Stormwater routing was also completed using the SCS Method and Hydraflow software. Calculations are included in the Appendix.

F. Summary of Predevelopment Runoff

The allowable release rate for the site was established, in Section 1: Site Characteristics, to be **82.44 cfs** for the on-site 5-year event. The total allowed including by-pass is **182.15 cfs** for the 5-yr event and **308.37 cfs** for the 100-yr.

G. Summary of Post Development Runoff

A summary of site release rates are as follows:

Table 2.1 – Summary of Post-Development Discharge

		Duration	*SCS*	*1-year*	*5-year*	*100-year*
		24hr	**CN value**	**2.67**	**3.81**	**7.12**
Location	**Area (AC)**	**TC (min)**	**Composite**	**Q1 (cfs)**	**Q5 (cfs)**	**Q100 (cfs)**
Proposed Basin A	17.36	n/a	**66**	0.86	1.28	3.50
Proposed Basin B1	7.80	n/a	**66**	0.57	1.15	10.38
Proposd Basin B (Dam)	32.19	n/a	**67**	48.57	91.93	194.31
Proposed Basin C	18.75	n/a	**62**	6.14	11.63	47.14
Proposed Basin D	4.20	n/a	**69**	2.55	6.66	21.90
Proposed Basin E	1.85	n/a	**70**	1.25	3.11	9.93
Proposed Basin B (lots 10-11)	1.45	15	**68**	0.17	0.38	8.08
Proposed Basin B (lots 51-52)	2.35	15	**68**	0.17	0.38	13.08
			Total Release	**60.28**	**116.51**	**308.32**
			Total allowed	**91.98**	**182.15**	**308.37**
			Net Change	**-31.70**	**-65.64**	**-0.05**

Storm water Conveyance Design

A. Design Information References

The design for storm water facilities and utilities follow the Iowa Statewide Urban Design Standards for Public Improvements, 2019 Edition.

B. Storm Sewer

The storm sewer for this site was designed to convey at a minimum the 100-year post development event. The Rational Method was used to determine flow rates for each individual area. The Manning's Equation was used to size each pipe. Refer to Section 8 for storm sewer design calculations.

C. Culverts

There are two culverts located on the project. Both are sized to pass the 100-yr flow generated from the offsite areas as modeled in hydraflow. Culverts were sized to pass the 100-yr event without exceeding the top of culvert.

D. Storm Drainage Outlets and Downstream Analysis

Storm water will leave the site at two discharge locations. See Section 2, Table 2.1 for a summary of post-development discharge rates from the site. Refer to F.02 Post-Development Conditions for basin locations.

E. Hydraulic Model

The Rational Method was used to determine storm sewer capacity for this project. Storm sewer routing and pond capacity was analyzed using Bentley Flow Master, V8i and Hydraflow by AutoCAD.

Storm Water Management Design

A. Design Standards

The design for storm water facilities follows the current version of the Iowa Storm Water Management Manual.

B. Detention Basin Location

There are five detention locations. All detention locations are dry detention and located at the lower end of their associated sub basin. Each pond is named for the sub basin it is located in. The existing dam, located in the center of Basin B, will be left in place. Refer to Section 7, Map index.

C. Detention Basin Performance

The ponds have been sized and modeled using Hydraflow Hydrographs by AutoCAD using the SCS Method for stormwater routing. The Ponds were modeled taking into consideration the following components:

1. Water Quality Volume
2. Channel Protection Volume
3. Extreme Flood Protection

Water Quality is accomplished on this site through extended detention and infiltration. Additionally, SQR will be incorporated in all green space areas to a minimum depth of 8-inches. This will mitigate environmental impacts on the area. Recharge calculations have been provided is Section 8 for reference of expected infiltration.

The Channel Protection volume is defined as providing detention to allow the smaller 1-year 24-hour duration storms to be held on site and slowly released over 24 to 48 hours. This will assist in protecting downstream channels from erosive velocities and unstable conditions.

The final component of the detention facility design was protecting downstream properties from the rare storm events up to the 100-year to ensure that runoff is not released at a rate greater than the pre-settlement rates.

D. Detention Basin Outlets

Pond A – 24” riser with a 15” outlet, primary low flow outlet of 6”, secondary outlet of 8”
Pond B1 – 24” riser with a 15” outlet, primary low flow outlet of 6”
Pond B2 – 24” riser with a 24” outlet, primary low flow outlet of 15”
Pond B3 – 24” riser with a 24” outlet, primary low flow outlet of 4”
Pond C3 – 30” riser with a 30” outlet, primary low flow outlet of 15”

E. Spillway and Embankment Protection

All detention ponds have an emergency spillway designed to pass extreme events while maintaining a minimum of one foot of free board.

F. Runoff Model

Peak discharges for Pre-Developed and Post-Developed conditions were determined for the detention facilities with Hydraflow Hydrographs by AutoCAD using the SCS Method for stormwater routing. Peak pond elevations were also determined for each rainfall event. Peak discharges were analyzed for both on-site flows and contributing off site flow routing. Refer to Section 8 for routing calculations. The following tables are a summary of the results:

Table 3.1 - Summary of Pond A Storage

Pond A		
	Required	**Provided**
Water Quality Volume Treated (cf)	18,117.33	61,837.78
CPv Release Rate (cfs)	6.68	0.86
CPv Storage Provided (cf)		6,723.00
CPv Water Surface Elevation		932.26
5-year Release Rate (cfs)	14.82	1.28
5-year Storage Provided (cf)		27,031.00
5-year Water Surface Elevation		933.36
100-year Release Rate (cfs)	14.82	3.50
100-year Storage Provided (cf)		116,512.00
100-year Water Surface Elevation		935.42

Table 3.2 - Summary of Pond B1 Storage

Pond B1		
	Required	**Provided**
Water Quality Volume Treated (cf)	41,734.56	153,313.78
CPv Release Rate (cfs)	16.44	0.57
CPv Storage Provided (cf)		2,716.00
CPv Water Surface Elevation		934.70
5-year Release Rate (cfs)	36.45	1.15
5-year Storage Provided (cf)		9,523.00
5-year Water Surface Elevation		935.99
100-year Release Rate (cfs)	36.45	10.38
100-year Storage Provided (cf)		35,289.00
100-year Water Surface Elevation		938.74

Table 3.3 - Summary of Pond B2 Storage

Pond B2		
	Required	**Provided**
Water Quality Volume Treated (cf)	41,734.56	153,313.78
CPv Release Rate (cfs)	16.44	1.92
CPv Storage Provided (cf)		2,818.00
CPv Water Surface Elevation		938.80
5-year Release Rate (cfs)	36.45	4.52
5-year Storage Provided (cf)		8,878.00
5-year Water Surface Elevation		939.49
100-year Release Rate (cfs)	36.45	13.57
100-year Storage Provided (cf)		45,904.00
100-year Water Surface Elevation		941.89

Table 3.4- Summary of Pond B3 Storage

Pond B3		
	Required	**Provided**
Water Quality Volume Treated (cf)	41,734.56	153,313.78
CPv Release Rate (cfs)	16.44	0.39
CPv Storage Provided (cf)		1,545.00
CPv Water Surface Elevation		938.11
5-year Release Rate (cfs)	36.45	0.55
5-year Storage Provided (cf)		6,697.00
5-year Water Surface Elevation		939.00
100-year Release Rate (cfs)	36.45	0.83
100-year Storage Provided (cf)		33,523.00
100-year Water Surface Elevation		941.26

Table 3.5 - Summary of Existing Dam

EXISTING DAM		
	Required	**Provided**
Water Quality Volume Treated (cf)	N/A	153,313.78
CPv Release Rate (cfs)	64.44	48.57
CPv Storage Provided (cf)		207,180.00
CPv Water Surface Elevation		942.70
5-year Release Rate (cfs)	122.02	81.93
5-year Storage Provided (cf)		227,590.00
5-year Water Surface Elevation		942.99
100-year Release Rate (cfs)	221.80	194.31
100-year Storage Provided (cf)		296,169.00
100-year Water Surface Elevation		943.76

Table 3.5 - Summary of Pond C3 Storage

Pond C3		
	Required	**Provided**
Water Quality Volume Treated (cf)	19,567.97	74,017.15
CPv Release Rate (cfs)	7.19	6.14
CPv Storage Provided (cf)		7,990.00
CPv Water Surface Elevation		938.07
5-year Release Rate (cfs)	15.90	11.63
5-year Storage Provided (cf)		32,224.00
5-year Water Surface Elevation		939.49
100-year Release Rate (cfs)	45.88	47.14
100-year Storage Provided (cf)		100,913.00
100-year Water Surface Elevation		941.49

WQV provided is based on the total volume SQR available on site in that perspective basin. See soil management plan and Section 8 for soil management plans.

SECTION 5
Permits

Contents

SECTION 6
References

Contents

Works Cited

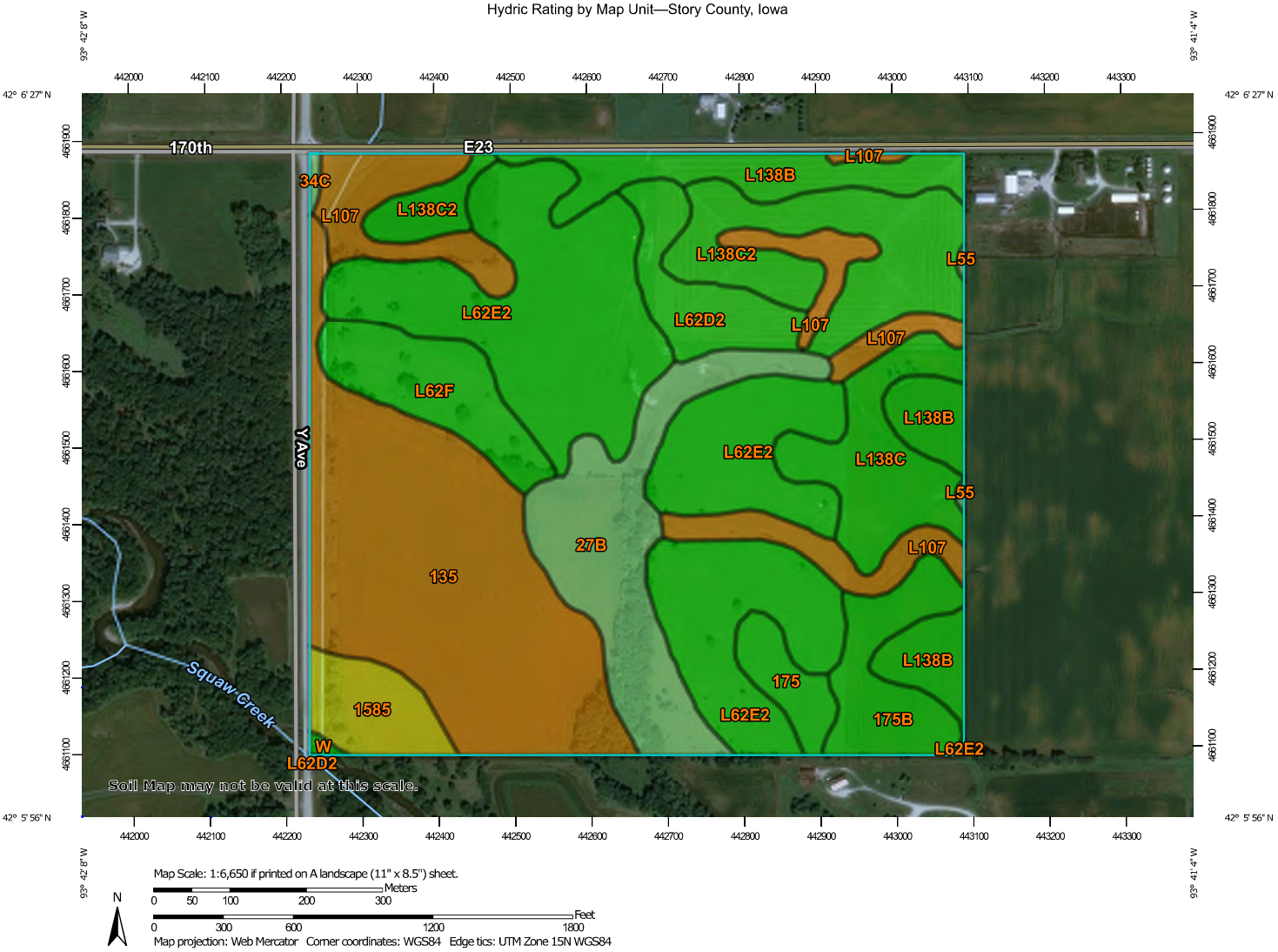
1. Statewide Urban Design and Specifications. (2020, January). Iowa Statewide Urban Design for Public Improvements 2020 Edition. http://www.iowasudas.org/design

2. Iowa Department of Natural Resources. (October 28, 2019). *Iowa Storm water Management Manual 2019 Edition*.

3. Hydraflow Hydrographs Extension for AutoCAD Civil 3D 2016. [Computer Software].

4. Natural Resource Conservation Service. (n.d.) Hydrologic Soil Group-Story County, Iowa. Retrieved April 19, 2019, from http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

Hydric Rating by Map Unit—Story County, Iowa



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Story County, Iowa
Survey Area Data: Version 31, Sep 14, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 26, 2012—Sep 28, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
27B	Terril loam, 2 to 6 percent slopes	8	15.2	9.1%
34C	Estherville sandy loam, 2 to 6 percent slopes	1	0.2	0.1%
135	Coland clay loam, 0 to 2 percent slopes, occasionally flooded	90	32.3	19.3%
175	Dickinson fine sandy loam, 0 to 2 percent slopes	0	3.0	1.8%
175B	Dickinson fine sandy loam, 2 to 5 percent slopes	0	6.7	4.0%
1585	Spillville-Coland complex, channeled, 0 to 2 percent slopes	40	4.7	2.8%
L55	Nicollet loam, 1 to 3 percent slopes	5	0.2	0.1%
L62D2	Storden loam, Bemis moraine, 10 to 16 percent slopes, moderately eroded	0	5.8	3.5%
L62E2	Storden loam, Bemis moraine, 10 to 22 percent slopes, moderately eroded	0	42.2	25.3%
L62F	Belview loam, Bemis moraine, 16 to 30 percent slopes	0	7.5	4.5%
L107	Webster clay loam, Bemis moraine, 0 to 2 percent slopes	95	13.4	8.1%
L138B	Clarion loam, Bemis moraine, 2 to 6 percent slopes	0	11.7	7.0%
L138C	Clarion loam, Bemis moraine, 6 to 10 percent slopes	0	8.8	5.3%
L138C2	Clarion loam, Bemis moraine, 6 to 10 percent slopes, moderately eroded	0	14.9	8.9%
W	Water	0	0.2	0.1%
Totals for Area of Interest			**166.9**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

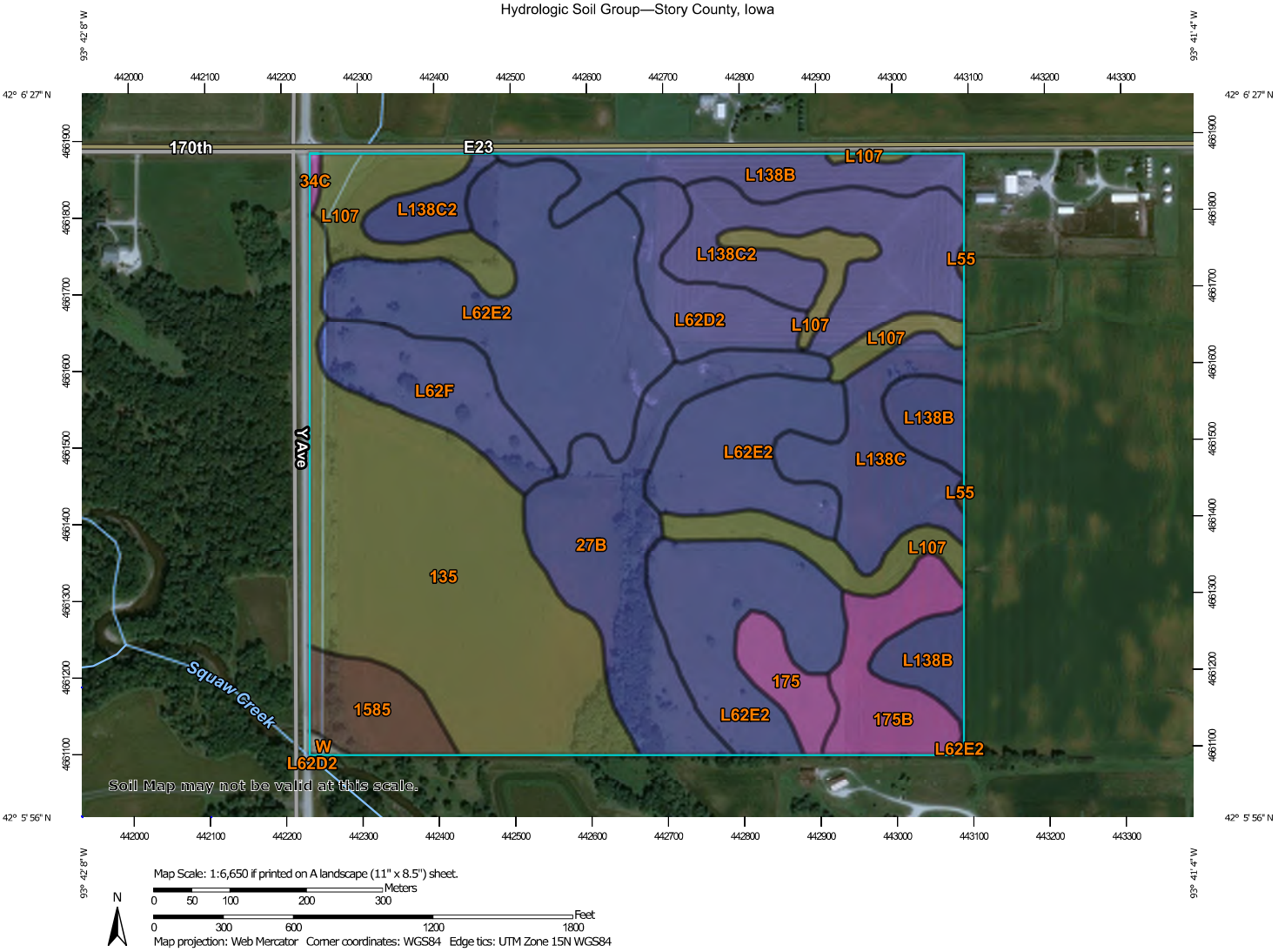
Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Hydrologic Soil Group—Story County, Iowa



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Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

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Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
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34C	Estherville sandy loam, 2 to 6 percent slopes	A	0.2	0.1%
135	Coland clay loam, 0 to 2 percent slopes, occasionally flooded	C/D	32.3	19.3%
175	Dickinson fine sandy loam, 0 to 2 percent slopes	A	3.0	1.8%
175B	Dickinson fine sandy loam, 2 to 5 percent slopes	A	6.7	4.0%
1585	Spillville-Coland complex, channeled, 0 to 2 percent slopes	B/D	4.7	2.8%
L55	Nicollet loam, 1 to 3 percent slopes	B/D	0.2	0.1%
L62D2	Storden loam, Bemis moraine, 10 to 16 percent slopes, moderately eroded	B	5.8	3.5%
L62E2	Storden loam, Bemis moraine, 10 to 22 percent slopes, moderately eroded	B	42.2	25.3%
L62F	Belview loam, Bemis moraine, 16 to 30 percent slopes	B	7.5	4.5%
L107	Webster clay loam, Bemis moraine, 0 to 2 percent slopes	C/D	13.4	8.1%
L138B	Clarion loam, Bemis moraine, 2 to 6 percent slopes	B	11.7	7.0%
L138C	Clarion loam, Bemis moraine, 6 to 10 percent slopes	B	8.8	5.3%
L138C2	Clarion loam, Bemis moraine, 6 to 10 percent slopes, moderately eroded	B	14.9	8.9%
W	Water		0.2	0.1%
Totals for Area of Interest			**166.9**	**100.0%**

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

U.S. Fish and Wildlife Service
National Wetlands Inventory

Dotson Farms, Story County, Iowa

November 20, 2019

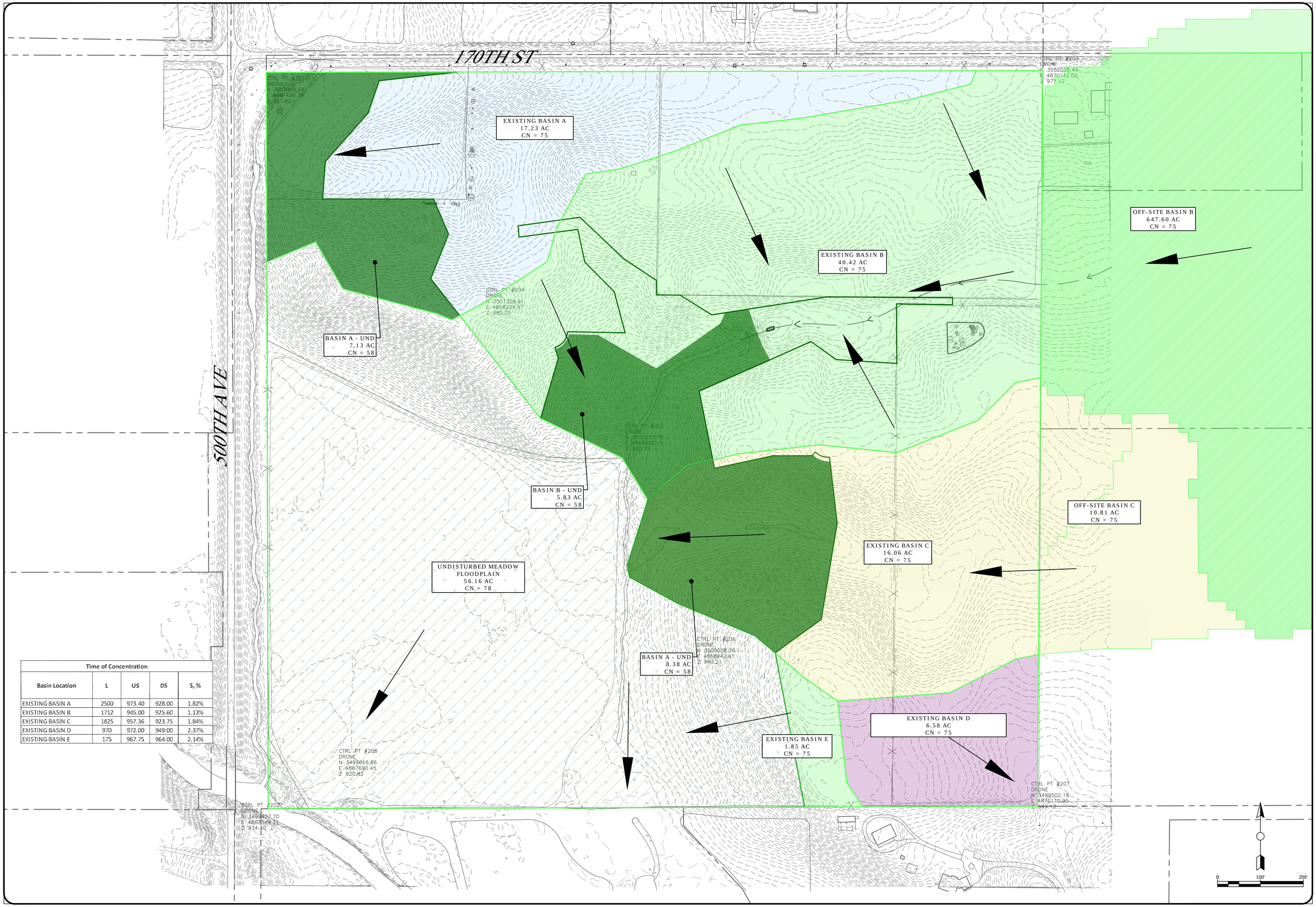
Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

SECTION 7
Map
Appendix

Contents


Project location
Gilbert



Time of Concentration				
Basin Location	L	US	DS	S, %
EXISTING BASIN A	2500	973.40	928.00	1.82%
EXISTING BASIN B	1712	945.00	925.60	1.13%
EXISTING BASIN C	1825	957.36	923.75	1.84%
EXISTING BASIN D	970	972.00	949.00	2.37%
EXISTING BASIN E	175	967.75	964.00	2.14%

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PLOT STYLE TABLE: FoxGray Scale.ctb
LAYER MNGR NAME:
LAYOUT NAME: F.01

DATE	REVISION	DESIGNED:	DRAWN:	CHECKED:	BY	DATE
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					ELT	03/20

LAST UPDATE: 3/4/20

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414 South 17th Street, Suite 107
Ames, Iowa 50010
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FOX engineering

EXISTING CONDITIONS
DOTSON FARMS
STORY COUNTY
2020

PROJECT NO.
5470-18A

SHEET
F.01

	L	US	DS	S, %
Proposed Basin B1	760	984.6	935	6.53%
Proposed Basin B2	1300	984	943	3.15%
Proposed Basin B3	950	963	937	2.74%
Proposed Basin B4	780	973	941	4.10%
Proposed Basin B5	751	960	941	2.53%
Proposed Basin C1	630	961	946	2.38%
Proposed Basin C2	457	960	944	3.50%
Proposed Basin C3	950	963	937	2.74%

PROPOSED BASIN A
17.36 AC
CN = 66

POND A

POND B1

POND B2

POND B3

POND C3

EXISTING DAM

PROPOSED BASIN B
39.99 AC
CN = 67

PROPOSED BASIN C
18.75 AC
CN = 62

PROPOSED BASIN D
4.20 AC
CN = 69

PROPOSED BASIN E
1.85 AC
CN = 70

BASIN A - UND
7.13 AC
CN = 58

BASIN B - UND
5.83 AC
CN = 58

BASIN A - UND
8.38 AC
CN = 58

Off-Site BASIN B Lower
115.97 AC
CN = 75

Off-Site BASIN C 1
2.66 AC
CN = 75

Off-Site BASIN C 2
8.14 AC
CN = 75

SOUTH AVE

LOT B
3226290 sq.ft.
74.07 acres

OUTLOT C
0.51 acres

OUTLOT D

OUTLOT E

OUTLOT G
11001 sq.ft.
0.25 acres

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Z: 930.79

CTRL PT #206
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	DRAWN:	ELT	03/20
	CHECKED:	ELT	03/20
LAST UPDATE: 3/4/20			

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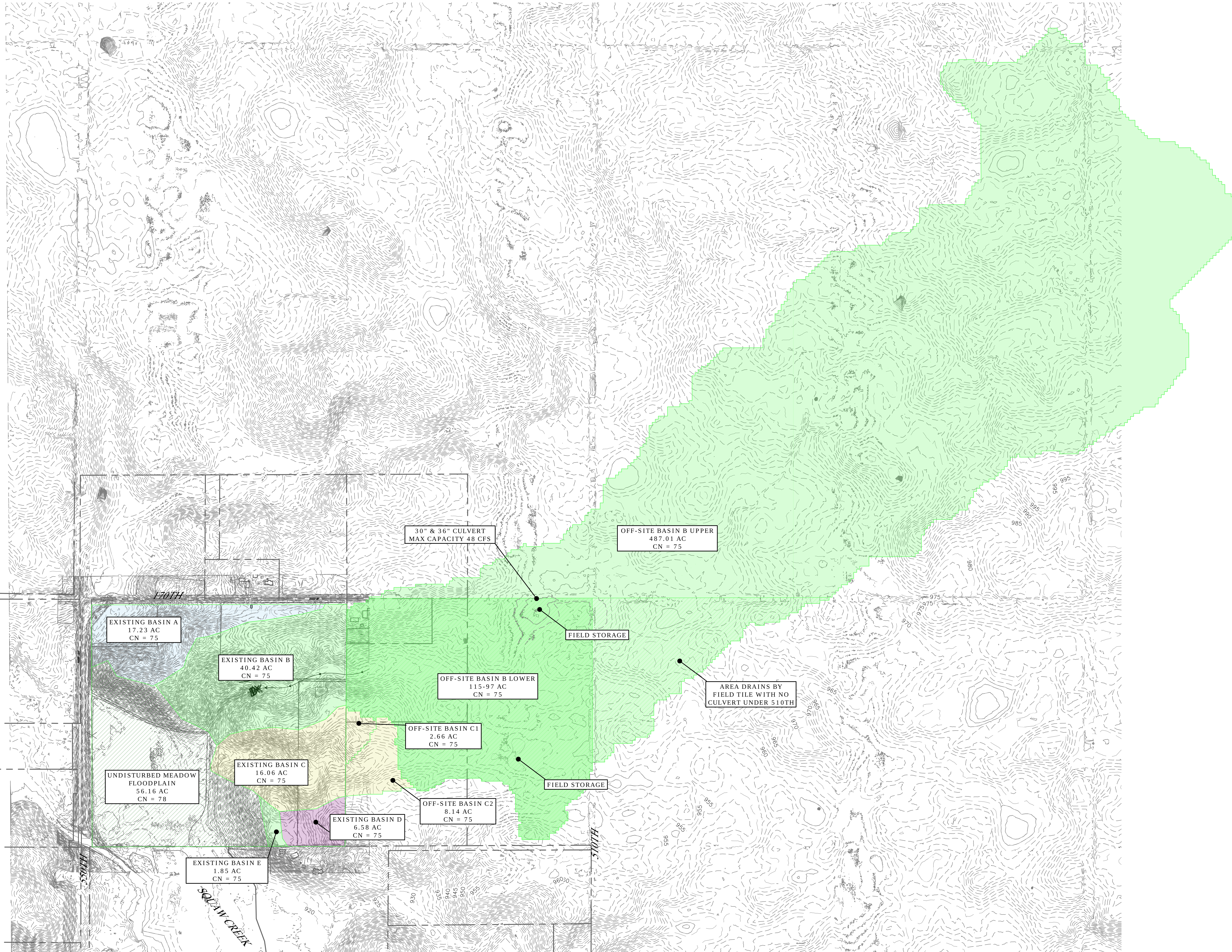
FOX engineering

DEVELOPED CONDITIONS
DOTSON FARMS
STORY COUNTY
2020

PROJECT NO.
5470-18A

SHEET
F.02



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DATE	REVISION	BY	DATE

	BY	DATE
DESIGNED:	ELT	03/20
DRAWN:	ELT	03/20
CHECKED:		

LAST UPDATE: 3/4/20

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EXISTING OFF-SITE CONDITIONS

DOTSON FARMS
STORY COUNTY
2020

PROJECT NO.
5470-18A

SHEET
F.03

SECTION 8
Calculation Appendix

Contents

Table 1: Manning Coefficient for Sheet Flows

Surface Description	*n*
Smooth Surface (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated Soils:	
Residue cover ≤ 20%	0.06
Residue cover > 20%	0.17
Grass:	
Short grass prairie	0.15
Dense grasses[1]	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods:[2]	
Light underbrush	0.40
Dense underbrush	0.80

Table 2: Velocity versus Slope for Shallow Concentrated Flow

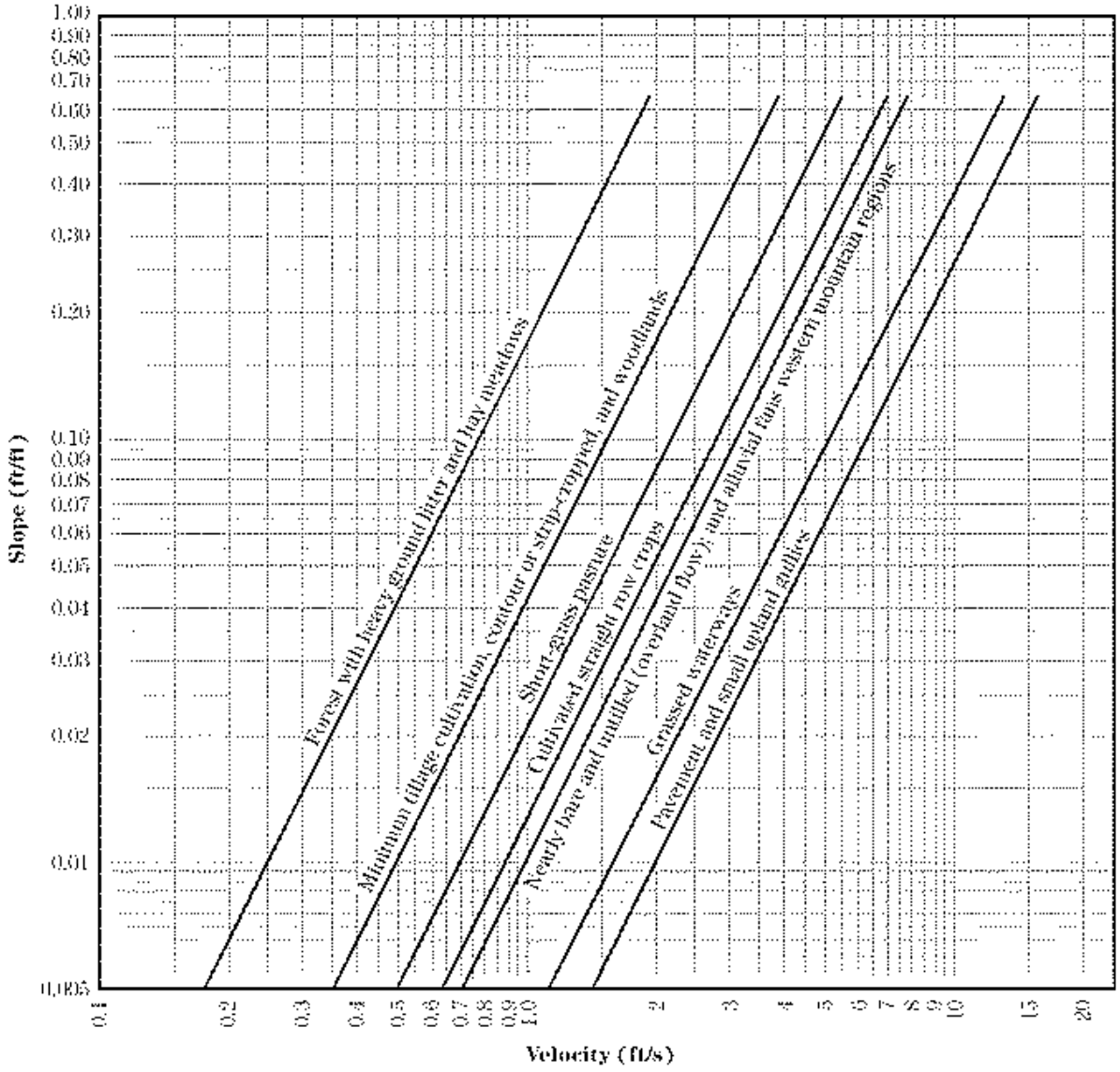

Table 3: Equations and assumptions developed from Table 2

Flow Type	Depth (feet)	Manning's n	Velocity Equation (ft/s)
Pavement and small upland gullies	0.2	0.025	$V = 20.238(s)^{0.5}$
Grassed waterways (and unpaved urban areas)	0.4	0.050	$V = 16.135(s)^{0.5}$
Nearly bare and untilled (overland flow); and alluvial fans	0.2	0.051	$V = 9.965(s)^{0.5}$
Cultivated straight row crops	0.2	0.058	$V = 8.762(s)^{0.5}$
Short-grass prairie	0.2	0.073	$V = 6.962(s)^{0.5}$
Minimum tillage cultivation, contour or strip-cropped, and woodlands	0.2	0.101	$V = 5.032(s)^{0.5}$
Forest with heavy ground litter and hay meadows	0.2	0.202	$V = 2.516(s)^{0.5}$

Table 4: Manning's Roughness Coefficients (n) for Open Channel Flow

Type of Channel and Description	n
A. Closed Conduits Flowing Partly Full	
1. Steel - Riveted and Spiral	0.016
2. Cast Iron - Coated	0.013
3. Cast Iron - Uncoated	0.014
4. Corrugated Metal - Subdrain	0.019
5. Corrugated Metal - Storm Drain	0.024
6. Concrete Culvert, straight and free of debris	0.011
7. Concrete Culvert, with bends, connections, and some debris	0.013
8. Concrete Sewer with manholes, inlet, etc., straight	0.015
9. Concrete, Unfinished, steel form	0.013
10. Concrete, Unfinished, smooth wood form	0.014
11. Wood - Stave	0.012
12. Clay - Vitrified sewer	0.014
13. Clay - Vitrified sewer with manholes, inlet, etc.	0.015
14. Clay - Vitrified subdrain with open joints	0.016
15. Brick - Glazed	0.013
16. Brick - Lined with cement mortar	0.015
B. Lined or Built-Up Channels	
1. Corrugated Metal	0.025
2. Wood - Planed	0.012
3. Wood - Unplaned	0.013
5. Concrete - Trowel finish	0.013
6. Concrete - Float finish	0.015
7. Concrete - Finished, with gravel on bottom	0.017
8. Concrete - Unfinished	0.017
9. Concrete Bottom Float Finished with sides of:	
a. Random stone in mortar	0.020
b. Cement rubble masonry	0.025
c. Dry rubble or rip rap	0.030
10. Gravel Bottom with sides of:	
a. Formed concrete	0.020
b. Dry rubble or rip rap	0.033
11. Brick - Glazed	0.013
12. Brick - In cement mortar	0.015
13. Masonry Cemented Rubble	0.025
14. Dry Rubble	0.032
15. Smooth Asphalt	0.013
16. Rough Asphalt	0.016
C. Excavated or Dredged Channel	
1. Earth, straight and uniform	
a. Clean, after weather	0.022
b. Gravel, uniform section, clean	0.025
c. With short grass, few weeds	0.027
2. Earth, winding and sluggish	
a. No vegetation	0.025
b. Grass, some weeds	0.030
c. Dense weeds or aquatic plants in deep channels	0.035
d. Earth bottom and rubble sides	0.030
e. Stony bottom and weedy banks	0.040
3. Channels not maintained, weeds and brush uncut	
a. Dense weeds, high as flow depth	0.080
b. Clean bottom, brush on sides	0.050
D. Natural Streams	
1. Clean, straight bank, full stage, no rifts or deep pools	0.030
2. As D.1 above, but some weeds and stones	0.035
3. Winding, some pools and shoals, clean	0.040
4. As D.3 above, but lower stages, more ineffective slope and sections	0.045
5. As D.3 above, but some weeds and stones	0.048
6. As D.4 above, but with stony sections	0.050
7. Sluggish river reaches, rather weedy or with very deep pools	0.070
8. Very weedy reaches	0.100

Proposed site Conditions Sub-Basin Area Calculations									
Basin Name	**Basin Area (sf)**	**Basin Area (ac)**	**Area Meadow (sf)**	**Area Meadow (ac)**	**Area Res 1/2 (sf)**	**Area Res (ac)**	**Meadow CN**	**Res CN**	**Composite CN**
Proposed Basin A	756,037	17.36	240,870	5.53	516,413	11.86	58	70	66
Proposed Basin A-UND	310,743	7.13	310,743	7.13	0	0.00	58	70	58
Proposed Basin B	1,742,158	39.99	464,449	10.66	1,277,709	29.33	58	70	67
Proposed Basin B-UND	253,801	5.83	253,801	5.83	0	0.00	58	70	58
Proposed Basin C	816,647	18.75	200,012	4.59	552,271	12.68	58	70	62
Proposed Basin C-UND	365,011	8.38	365,011	8.38	0	0.00	58	70	58
Proposed Basin D	182,863	4.20	9,826	0.23	173,037	3.97	58	70	69
Proposed Basin E	80,379	1.85	0	0.00	80,379	1.85	58	70	70
UNDISTURBED MEADOW	2,446,211	56.16	2,446,211	56.16	0	0.00	58	70	58
CONTRIBUTING TOTALS	**6,953,850**	**159.64**	**1,844,713**	**42.35**	**2,599,809**	**59.68**		CN Total =	**63**
				26.53%		37.39%			

Basin Name	Basin Area (sf)	Basin Area (ac)	Area Meadow (sf)	Area Meadow (ac)	Area Res 1/2 (sf)	Area Res (ac)	Meadow CN	Res CN	Composite CN
Proposed Basin B1	339,973	7.80	103,496	2.38	236,478	5.43	58	70	66
Proposed Basin B2	507,848	11.66	107,460	2.47	400,388	9.19	58	70	67
Proposed Basin B3	214,925	4.93	64,013	1.47	150,913	3.46	58	70	66
Proposed Basin B4	201,000	4.61	48,512	1.11	152,489	3.50	58	70	67
Proposed Basin B5	111,950	2.57	27,844	0.64	84,106	1.93	58	70	67
Proposed Basin B (lots 10-11)	63,355	1.45	0	0.00	63,355	1.45	58	68	68
Proposed Basin B (lots 22-23)	41,781	0.96	0	0.00	41,781	0.96	58	70	70
Proposed Basin B (lots 51-52)	102,193	2.35	0	0.00	102,193	2.35	58	68	68
Proposed Basin B (UND TO DAM)	159,133	3.65	37,834	0.87	121,299	2.78	58	70	67
	1,742,158	**39.99**	**389,157**	**8.93**	**1,353,001**	**31.06**		CN Total =	**67**
Proposed Basin C1	146,778	3.37	62,326	1.43	84,452	1.94	58	70	65
Proposed Basin C2	165,849	3.81	46,370	1.06	119,479	2.74	58	70	67
Proposed Basin C3	504,020	11.57	166,918	3.83	337,102	7.74	58	70	66
Proposed Basin D1	182,863	4.20	10,940	0.25	171,923	3.95	58	70	69
Proposed Basin E1	80,379	1.85	0	0.00	80,379	1.85	58	70	70
CONTRIBUTING TOTALS	**6,953,850**	**159.64**	**4,292,347**	**98.54**	**2,662,749**	**61.13**		CN Total =	**67**

Table 2B-4.01: Runoff Coefficients for the Rational Method

Cover Type and Hydrologic Condition		Runoff Coefficients for Hydrologic Soil Group											
		A			*B*			*C*			*D*		
Recurrence Interval		*5*	*10*	*100*	*5*	*10*	*100*	*5*	*10*	*100*	*5*	*10*	*100*
Open Space (lawns, parks, golf courses, cemeteries, etc.)													
Poor condition (grass cover < 50%)		.25	.30	.50	.45	.55	.65	.65	.70	.80	.70	.75	.85
Fair condition (grass cover 50% to 75%)		.10	.10	.15	.25	.30	.50	.45	.55	.65	.60	.65	.75
Good condition (grass cover >75%)		.05	.05	.10	.15	.20	.35	.35	.40	.55	.50	.55	.65
Impervious Areas													
Parking lots, roofs, driveways, etc. (excluding ROW)		.95	.95	.98	.95	.95	.98	.95	.95	.98	.95	.95	.98
Streets and roads:													
Paved; curbs & storm sewers (excluding ROW)		.95	.95	.98	.95	.95	.98	.95	.95	.98	.95	.95	.98
Paved; open ditches (including ROW)		---	---	---	.70	.75	.85	.80	.85	.90	.80	.85	.90
Gravel (including ROW)		---	---	---	.60	.65	.75	.70	.75	.85	.75	.80	.85
Dirt (including ROW)		---	---	---	.55	.60	.70	.65	.70	.80	.70	.75	.85
Urban Districts (excluding ROW)													
Commercial and business (85% impervious)		---	---	---	---	---	---	.85	.85	.90	.90	.90	.95
Industrial (72% impervious)		---	---	---	---	---	---	.80	.80	.85	.80	.85	.90
Residential Districts by Average Lot Size (excluding ROW)[1]													
1/8 acre (36% impervious)		---	---	---	---	---	---	.55	.60	.70	.65	.70	.75
1/4 acre (36% impervious)		---	---	---	---	---	---	.55	.60	.70	.65	.70	.75
1/3 acre (33% impervious)		---	---	---	---	---	---	.55	.60	.70	.65	.70	.75
1/2 acre (20% impervious)		---	---	---	---	---	---	.45	.50	.65	.60	.65	.70
1 acre (11% impervious)		---	---	---	---	---	---	.40	.45	.60	.55	.60	.65
2 acres (11% impervious)		---	---	---	---	---	---	.40	.45	.60	.55	.60	.65
Newly Graded Areas (pervious areas only, no vegetation)													
Agricultural and Undeveloped													
Meadow - protected from grazing (pre-settlement)		.10	.10	.25	.10	.15	.30	.30	.35	.55	.45	.50	.65
Straight Row Crops													
Straight Row (SR)	*Poor Condition*	.33	.39	.55	.52	.58	.71	.70	.74	.84	.78	.81	.89
	Good Condition	.24	.30	.46	.45	.51	.66	.62	.67	.78	.73	.76	.86
SR + Crop Residue (CR)	*Poor Condition*	.31	.37	.54	.50	.56	.70	.67	.72	.82	.75	.79	.87
	Good Condition	.19	.25	.41	.38	.45	.61	.55	.60	.73	.62	.67	.78
Contoured (C).....	*Poor Condition*	.29	.35	.52	.47	.53	.70	.60	.65	.77	.70	.74	.84
	Good Condition	.21	.26	.43	.38	.45	.61	.55	.60	.73	.65	.69	.80
C+CR.....	*Poor Condition*	.27	.33	.50	.45	.51	.66	.57	.63	.75	.67	.72	.82
	Good Condition	.19	.25	.41	.36	.43	.59	.52	.58	.71	.62	.67	.78
Contoured & Terraced (C&T)	*Poor Condition*	.22	.28	.45	.36	.43	.59	.50	.56	.70	.55	.60	.73
	Good Condition	.16	.22	.38	.31	.37	.54	.45	.51	.66	.52	.58	.71
C&T + CR	*Poor Condition*	.13	.19	.35	.31	.37	.54	.45	.51	.66	.52	.58	.71
	Good Condition	.10	.16	.32	.27	.33	.50	.43	.49	.65	.50	.56	.70

[1] The average percent impervious area shown was used to develop composite coefficients.

Note: Rational coefficients were derived from SCS CN method

b. Composite Runoff Analysis: Care should be taken not to average runoff coefficients for large segments that have multiple land uses of a wide variety (i.e., business to agriculture). However, within similar land uses, it is often desirable to develop a composite runoff coefficient based on the percentage of different types of surface in the drainage area. The composite procedure can be applied to an entire drainage area, or to typical sample blocks as a guide to selection of reasonable values of the coefficient for an entire area.

Table 2B-4.03: Runoff Curve Numbers for Urban Areas[1]

Cover Type and Hydrologic Condition	Average Percent Impervious Area[2]	CN's for Hydrologic Soil Group			
		A	***B***	***C***	***D***
Fully Developed Urban Areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.):[3]					
Poor condition (grass cover < 50%)	----------	68	79	86	89
Fair condition (grass cover 50% to 75%)	----------	49	69	79	84
Good condition (grass cover >75%)	----------	39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	----------	98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)	----------	98	98	98	98
Paved; open ditches (including right-of-way)	----------	83	89	92	93
Gravel (including right-of-way)	----------	76	85	89	91
Dirt (including right-of-way)	----------	72	82	87	89
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town homes)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing Urban Areas					
Newly graded areas (pervious areas only, no vegetation)[4]	----------	77	86	91	94
Idle lands (CN's are determined using cover types similar to those in Table 2B-4.01)					

[1] Average runoff condition and I_a=0.2S

[2] The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using Figures 2B-4.01 or 2B-4.02.

[3] CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

[4] Composite CN's to use for the design of temporary measures during grading and construction should be computed using Figures 2B-4.01 or 2B-4.02 based upon the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Source: NRCS National Engineering Handbook, Part 630, Chapter 9

Table 2B-4.04: Runoff Curve Numbers for Cultivated Agricultural Lands[1]

Cover Description			**CN's for Hydrologic Soil Group**			
Cover Type	***Treatment[2]***	***Hydrologic Condition[3]***	***A***	***B***	***C***	***D***
Fallow	Bare Soil	---	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row Crops	Straight Row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T + CR	Poor	65	73	79	81
		Good	61	70	77	80
Small Grain	Straight Row (SR)	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	Contoured (C)	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	Contoured & terraced (C&T)	Poor	61	72	79	82
		Good	59	70	78	81
	C&T + CR	Poor	60	71	78	81
		Good	58	69	77	80
Close Seeded or Broadcast Legumes or Rotation Meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

[1] Average runoff condition and I_a=0.2S

[2] Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

[3] Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good ≥20%), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Source: NRCS National Engineering Handbook, Part 630, Chapter 9

Table 2B-4.05: Runoff Curve Numbers for Other Agricultural Lands[1]

Cover Description		**CN's for Hydrologic Soil Group**			
Cover Type	***Hydrologic Condition[3]***	***A***	***B***	***C***	***D***
Pasture, grassland, or range - continuous forage for grazing[2]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow - continuous grass, protected from grazing and generally mowed for hay	---	30	58	71	78
Brush - brush-weed-grass mixture with brush the major element[3]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30[4]	48	65	73
Woods - grass combination (orchard or tree farm)[5]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods[6]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Farmsteads - buildings, lanes, driveways, and surrounding lots	---	59	74	82	86

[1] Average runoff condition and I_a=0.2S.
[2] *Poor*: <50% ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: >75% ground cover and lightly or only occasionally grazed.
[3] *Poor*: <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.
[4] Actual curve number is less than 30; use CN = 30 for runoff computations
[5] CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.
[6] *Poor*: Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed, but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing and litter and brush adequately cover the soil

2. SCS Depth of Runoff: Depth of runoff may be calculated through the SCS Curve Number Method. This method separates total rainfall into direct runoff, retention, and initial abstraction to yield the following equation for rainfall runoff.

$$Q = \frac{(P-I_a)^2}{(P-I_a)+S}$$ **Equation 2B-4.04**

where:

Q = Depth of direct runoff, in
P = Depth of 24 hour precipitation, in. for design year storm (e.g. 10 year, 24 hour)
S = Potential maximum retention after runoff begins, in
I_a = Initial abstraction, in

The initial abstraction (I_a) is all losses before runoff begins. It includes water retained in surface depressions, water intercepted by vegetation, evaporation, and infiltration during the early part of the storm. Interception and surface depression storage may be estimated from cover and surface conditions, but infiltration during the early part of the storm is highly variable and dependent on such factors as rainfall intensity, soil crusting, and soil moisture. Establishing a relationship for I_a

BASIN C RCP CULVERT

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Normal Depth	3.00	ft
Diameter	3.00	ft

Results

Discharge	66.69	ft^3/s
Flow Area	7.07	ft^2
Wetted Perimeter	9.42	ft
Hydraulic Radius	0.75	ft
Top Width	0.00	ft
Critical Depth	2.61	ft
Percent Full	100.0	%
Critical Slope	0.00912	ft/ft
Velocity	9.44	ft/s
Velocity Head	1.38	ft
Specific Energy	4.38	ft
Froude Number	0.00	
Maximum Discharge	71.74	ft^3/s
Discharge Full	66.69	ft^3/s
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

BASIN C RCP CULVERT

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	3.00	ft
Critical Depth	2.61	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00912	ft/ft

30" CMP Culvert Under 170th

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.024	
Channel Slope	0.31000	%
Normal Depth	30.00	in
Diameter	30.00	in

Results

Discharge	12.37	ft³/s
Flow Area	4.91	ft²
Wetted Perimeter	7.85	ft
Hydraulic Radius	7.50	in
Top Width	0.00	ft
Critical Depth	1.18	ft
Percent Full	100.0	%
Critical Slope	0.01509	ft/ft
Velocity	2.52	ft/s
Velocity Head	0.10	ft
Specific Energy	2.60	ft
Froude Number	0.00	
Maximum Discharge	13.31	ft³/s
Discharge Full	12.37	ft³/s
Slope Full	0.00310	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

30" CMP Culvert Under 170th

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	30.00	in
Critical Depth	1.18	ft
Channel Slope	0.31000	%
Critical Slope	0.01509	ft/ft

36" CMP Culvert Under 170th

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.024	
Channel Slope	0.82000	%
Normal Depth	36.00	in
Diameter	36.00	in

Results

Discharge	32.71	ft³/s
Flow Area	7.07	ft²
Wetted Perimeter	9.42	ft
Hydraulic Radius	9.00	in
Top Width	0.00	ft
Critical Depth	1.86	ft
Percent Full	100.0	%
Critical Slope	0.01655	ft/ft
Velocity	4.63	ft/s
Velocity Head	0.33	ft
Specific Energy	3.33	ft
Froude Number	0.00	
Maximum Discharge	35.19	ft³/s
Discharge Full	32.71	ft³/s
Slope Full	0.00820	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

36" CMP Culvert Under 170th

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	36.00	in
Critical Depth	1.86	ft
Channel Slope	0.82000	%
Critical Slope	0.01655	ft/ft

4'x4' BOX CULVERT

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Normal Depth	4.00	ft
Height	4.00	ft
Bottom Width	4.00	ft

Results

Discharge	182.88	ft³/s
Flow Area	16.00	ft²
Wetted Perimeter	16.00	ft
Hydraulic Radius	1.00	ft
Top Width	4.00	ft
Critical Depth	4.02	ft
Percent Full	100.0	%
Critical Slope	0.00673	ft/ft
Velocity	11.43	ft/s
Velocity Head	2.03	ft
Specific Energy	6.03	ft
Froude Number	1.01	
Discharge Full	182.88	ft³/s
Slope Full	0.01000	ft/ft
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

4'x4' BOX CULVERT

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	4.00	ft
Critical Depth	4.02	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00673	ft/ft

DOTSON FARMS

FOX PN 5470-18A

Date 3/12/2020

BASIN A

Water Quality Volume

$$WQv = \frac{RV \times P \times A}{12} = (acre - ft)$$

RV = Volumetric Runoff Coefficient

I = Percent Impervious Area (%)	**20**	%
RV = 0.05 + 0.009(I) = 0.23	**0.23**	
P = Water Quality Rainfall Depth =	**1.25**	inches
A = Total Drainage Area	**17.36**	acres
Impervious Area	3.558	acres

WQv = (0.23 X 1.25 X 17.36) / 12 X 43,560 ft² / 1 acre = 18,117.33 ft³

Runoff Curve Numbers

$$CN_{WQv} = \frac{1000}{10 + (5 \times P) + (10 \times Q_a) - 10\left(Q_a^{\,2} + 1.25 \times Q_a \times P\right)^{1/2}}$$

Q_a = Water Quality Runoff Volume = Rv+P = watershed inches

= 0.23 X 1.25 = 0.29 watershed inches

CN_{WQv} = 85

$CN_{Composite}$ = 66

Water Quality Average Release Rate

$$Q_{WQv} = \frac{WQv}{24 \text{ hrs} \times 3600 \text{ s/hr}} = \frac{18{,}117.33}{86{,}400} = \mathbf{0.21\ cfs}$$

Water Quality Peak Release Rate

$Q_{WQv\ peak}$ = 2 x Q_{WQv} = 2 X 0.21 = **0.42 cfs**

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FOX PN 5470-18A

Date 3/12/2020

BASIN B

Water Quality Volume

$$WQv = \frac{RV \times P \times A}{12} = (acre - ft)$$

RV = Volumetric Runoff Coefficient

I = Percent Impervious Area (%)	**20**	%
RV = 0.05 + 0.009(I) = 0.23	**0.23**	
P = Water Quality Rainfall Depth =	**1.25**	inches
A = Total Drainage Area	**39.99**	acres
Impervious Area	8.799	acres

WQv = (0.23 X 1.25 X 39.99) / 12 X 43,560 ft² / 1 acre = 41,734.56 ft³

Runoff Curve Numbers

$$CN_{WQv} = \frac{1000}{10 + (5 \times P) + (10 \times Q_a) - 10\left(Q_a^{\,2} + 1.25 \times Q_a \times P\right)^{1/2}}$$

Q_a = Water Quality Runoff Volume = Rv+P = watershed inches

= 0.23 X 1.25 = 0.29 watershed inches

CN_{WQv} = 85

$CN_{Composite}$ = 66

Water Quality Average Release Rate

$$Q_{WQv} = \frac{WQv}{24 \text{ hrs} \times 3600 \text{ s/hr}} = \frac{41{,}734.56}{86{,}400} = \mathbf{0.48\ cfs}$$

Water Quality Peak Release Rate

$Q_{WQv\ peak}$ = 2 x Q_{WQv} = 2 X 0.48 = **0.97 cfs**

DOTSON FARMS

FOX PN 5470-18A

Date 3/12/2020

BASIN C

Water Quality Volume

$$WQv = \frac{RV \times P \times A}{12} = (acre - ft)$$

RV = Volumetric Runoff Coefficient

I = Percent Impervious Area (%)	**20**	%
RV = 0.05 + 0.009(I) = 0.23	**0.23**	
P = Water Quality Rainfall Depth =	**1.25**	inches
A = Total Drainage Area	**18.75**	acres
Impervious Area	3.804	acres

WQv = $\frac{\textbf{0.23} \times \textbf{1.25} \times \textbf{18.75}}{\textbf{12}} \times \frac{\textbf{43,560 ft}^2}{\textbf{1 acre}} =$ **19,567.97** ft^3

Runoff Curve Numbers

$$CN_{WQv} = \frac{1000}{10 + (5 \times P) + (10 \times Q_a) - 10\left(Q_a^{\,2} + 1.25 \times Q_a \times P\right)^{1/2}}$$

Q_a = Water Quality Runoff Volume = Rv+P = watershed inches

= 0.23 X 1.25 = 0.29 watershed inches

CN_{WQv} = **85**

$CN_{Composite}$ = **66**

Water Quality Average Release Rate

$$Q_{WQv} = \frac{WQv}{24 \text{ hrs} \times 3600 \text{ s/hr}} = \frac{19{,}567.97}{86{,}400} = \textbf{0.23 cfs}$$

Water Quality Peak Release Rate

$Q_{WQv\ peak} = 2 \times Q_{WQv}$ = 2 X 0.23 = **0.45 cfs**

DOTSON FARMS

FOX PN 5470-18A

Date 3/12/2020

BASIN D

Water Quality Volume

$$WQv = \frac{RV \times P \times A}{12} = (acre - ft)$$

RV = Volumetric Runoff Coefficient

I = Percent Impervious Area (%)	**20**	%
RV = 0.05 + 0.009(I) = 0.23	**0.23**	
P = Water Quality Rainfall Depth =	**1.25**	inches
A = Total Drainage Area	**4.2**	acres
Impervious Area	1.185	acres

WQv = $\frac{\textbf{0.23} \times \textbf{1.25} \times \textbf{4.2}}{\textbf{12}} \times \frac{\textbf{43,560 ft}^2}{\textbf{1 acre}} =$ **4,383.23** $\textbf{ft}^3$

Runoff Curve Numbers

$$CN_{WQv} = \frac{1000}{10 + (5 \times P) + (10 \times Q_a) - 10\left(Q_a^{\,2} + 1.25 \times Q_a \times P\right)^{1/2}}$$

Q_a = Water Quality Runoff Volume = Rv+P = watershed inches

= 0.23 **X** 1.25 **=** 0.29 watershed inches

CN_{WQv} = **85**

$CN_{Composite}$ = **66**

Water Quality Average Release Rate

$$Q_{WQv} = \frac{WQv}{24 \text{ hrs} \times 3600 \text{ s/hr}} = \frac{4{,}383.23}{86{,}400} =$$ **0.05 cfs**

Water Quality Peak Release Rate

$Q_{WQv\ peak}$ = 2 x Q_{WQv} = 2 **X** 0.05 = **0.10 cfs**

DOTSON FARMS

FOX PN 5470-18A

Date 3/12/2020

BASIN E

Water Quality Volume

$$WQv = \frac{RV \times P \times A}{12} = (acre - ft)$$

RV = Volumetric Runoff Coefficient

I = Percent Impervious Area (%)	**20**	%
RV = 0.05 + 0.009(I) = 0.23	**0.23**	
P = Water Quality Rainfall Depth =	**1.25**	inches
A = Total Drainage Area	**1.85**	acres
Impervious Area	0.555	acres

WQv = $\frac{\textbf{0.23} \times \textbf{1.25} \times \textbf{1.85}}{\textbf{12}} \times \frac{\textbf{43,560 ft}^2}{\textbf{1 acre}} =$ **1,930.71** $\textbf{ft}^3$

Runoff Curve Numbers

$$CN_{WQv} = \frac{1000}{10 + (5 \times P) + (10 \times Q_a) - 10\left(Q_a^{\,2} + 1.25 \times Q_a \times P\right)^{1/2}}$$

Q_a = Water Quality Runoff Volume = Rv+P = watershed inches

= 0.23 **X** 1.25 **=** 0.29 watershed inches

CN_{WQv} = **85**

$CN_{Composite}$ = **66**

Water Quality Average Release Rate

$$Q_{WQv} = \frac{WQv}{24 \text{ hrs} \times 3600 \text{ s/hr}} = \frac{1{,}930.71}{86{,}400} =$$ **0.02 cfs**

Water Quality Peak Release Rate

$Q_{WQv\ peak}$ = 2 x Q_{WQv} = 2 **X** 0.02 = **0.04 cfs**

DOTSON FARMS

FOX PN 5470-18A

Date 3/12/2020

SQR Worksheet - Basin A

Soil Quality Restoration Calculations

% SOM By Weight	Bulk Density (gm/cm^3)	Available Water storage (in/in soil)	Available Water storage (in/4 in soil)	Available Water storage (in/6 in soil)	Available Water storage (in/8 in soil)
1	1.25	0.13	0.52	0.77	1.03
2	1.25	0.17	0.66	1.00	1.33
3	1.25	0.20	0.81	1.22	1.62
4	1.25	0.24	0.96	1.44	1.92
5	1.25	0.28	1.11	1.66	2.22
6	1.25	0.31	1.26	1.88	2.51
7	1.25	0.35	1.40	2.11	2.81
8	1.25	0.39	1.55	2.33	3.10

SQR Depth	**8.00**	in
% SOM By Weight	**4**	%
Available water storage	**1.920**	in
Total Area SQR (0.75 * (17.36-5.53))	**8.8725**	Acres

$$\text{SQR} = \frac{1.92}{12\text{ in}} \times 8.87 \times \frac{43{,}560\text{ ft}^2}{1\text{ acre}}$$

61,837.78 ft^3

DOTSON FARMS

FOX PN 5470-18A

Date 3/12/2020

SQR Worksheet - Basin B

Soil Quality Restoration Calculations

% SOM By Weight	Bulk Density (gm/cm^3)	Available Water storage (in/in soil)	Available Water storage (in/4 in soil)	Available Water storage (in/6 in soil)	Available Water storage (in/8 in soil)
1	1.25	0.13	0.52	0.77	1.03
2	1.25	0.17	0.66	1.00	1.33
3	1.25	0.20	0.81	1.22	1.62
4	1.25	0.24	0.96	1.44	1.92
5	1.25	0.28	1.11	1.66	2.22
6	1.25	0.31	1.26	1.88	2.51
7	1.25	0.35	1.40	2.11	2.81
8	1.25	0.39	1.55	2.33	3.10

SQR Depth	**8.00**	in
% SOM By Weight	**4**	%
Available water storage	**1.920**	in
Total Area SQR (0.75 * (39.99-10.66))	**21.9975**	Acres

$$\text{SQR} = \frac{1.92}{12\text{ in}} \times 22.00 \times \frac{43{,}560\text{ ft}^2}{1\text{ acre}}$$

153,313.78 ft^3

DOTSON FARMS

FOX PN 5470-18A

Date 3/12/2020

SQR Worksheet - Basin C

Soil Quality Restoration Calculations

% SOM By Weight	Bulk Density (gm/cm^3)	Available Water storage (in/in soil)	Available Water storage (in/4 in soil)	Available Water storage (in/6 in soil)	Available Water storage (in/8 in soil)
1	1.25	0.13	0.52	0.77	1.03
2	1.25	0.17	0.66	1.00	1.33
3	1.25	0.20	0.81	1.22	1.62
4	1.25	0.24	0.96	1.44	1.92
5	1.25	0.28	1.11	1.66	2.22
6	1.25	0.31	1.26	1.88	2.51
7	1.25	0.35	1.40	2.11	2.81
8	1.25	0.39	1.55	2.33	3.10

SQR Depth	**8.00**	in
% SOM By Weight	**4**	%
Available water storage	**1.920**	in
Total Area SQR (0.75 * (18.75-4.59))	**10.62**	Acres

$$\text{SQR} = \frac{1.92}{12\text{ in}} \times \frac{10.62 \times 43{,}560\ \text{ft}^2}{1\text{ acre}} = \mathbf{74{,}017.15}\ \text{ft}^3$$

DOTSON FARMS

FOX PN 5470-18A

Date 3/12/2020

SQR Worksheet - Basin D

Soil Quality Restoration Calculations

% SOM By Weight	Bulk Density (gm/cm^3)	Available Water storage (in/in soil)	Available Water storage (in/4 in soil)	Available Water storage (in/6 in soil)	Available Water storage (in/8 in soil)
1	1.25	0.13	0.52	0.77	1.03
2	1.25	0.17	0.66	1.00	1.33
3	1.25	0.20	0.81	1.22	1.62
4	1.25	0.24	0.96	1.44	1.92
5	1.25	0.28	1.11	1.66	2.22
6	1.25	0.31	1.26	1.88	2.51
7	1.25	0.35	1.40	2.11	2.81
8	1.25	0.39	1.55	2.33	3.10

SQR Depth	**8.00**	in
% SOM By Weight	**4**	%
Available water storage	**1.920**	in
Total Area SQR (0.75 * (4.20-0.23))	**2.9775**	Acres

$$\text{SQR} = \frac{1.92}{12\text{ in}} \times 2.98 \times \frac{43{,}560\text{ ft}^2}{1\text{ acre}} = \mathbf{20{,}751.98}\ \text{ft}^3$$

DOTSON FARMS

FOX PN 5470-18A

Date 3/12/2020

SQR Worksheet - Basin E

Soil Quality Restoration Calculations

% SOM By Weight	Bulk Density (gm/cm^3)	Available Water storage (in/in soil)	Available Water storage (in/4 in soil)	Available Water storage (in/6 in soil)	Available Water storage (in/8 in soil)
1	1.25	0.13	0.52	0.77	1.03
2	1.25	0.17	0.66	1.00	1.33
3	1.25	0.20	0.81	1.22	1.62
4	1.25	0.24	0.96	1.44	1.92
5	1.25	0.28	1.11	1.66	2.22
6	1.25	0.31	1.26	1.88	2.51
7	1.25	0.35	1.40	2.11	2.81
8	1.25	0.39	1.55	2.33	3.10

SQR Depth	**8.00**	in
% SOM By Weight	**4**	%
Available water storage	**1.920**	in
Total Area SQR (0.75 * 1.85)	**1.3875**	Acres

$$\text{SQR} = \frac{1.92}{12\text{ in}} \times 1.39 \times \frac{43{,}560\text{ ft}^2}{1\text{ acre}} = 9{,}670.32\ \text{ft}^3$$

SECTION 8
Storm Water Runoff Analysis

Dotson Farms Subdivision
Story County, Iowa
FOX PN: 5470-18A

Hydraflow Table of Contents

EXISTING.gpw

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 03 / 13 / 2020

5 - Year

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)							Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	62.63	-------	-------	137.32	-------	-------	-------	406.78	Off-Site Basin B (upper)
2	SCS Runoff	------	2.144	-------	-------	4.601	-------	-------	-------	13.13	Off-Site Basin C1
3	SCS Runoff	------	4.346	-------	-------	9.540	-------	-------	-------	27.45	Off-Site Basin C2
4	SCS Runoff	------	26.48	-------	-------	59.04	-------	-------	-------	173.35	Off-Site Basin B (lower)
5	Reservoir	4	2.254	-------	-------	37.57	-------	-------	-------	137.35	Offsite Field Storage
6	SCS Runoff	------	6.681	-------	-------	14.82	-------	-------	-------	42.94	EXISTING BASIN A
7	SCS Runoff	------	16.44	-------	-------	36.45	-------	-------	-------	105.59	EXISTING BASIN B
8	SCS Runoff	------	7.192	-------	-------	15.90	-------	-------	-------	45.88	EXISTING BASIN C
9	SCS Runoff	------	4.838	-------	-------	10.47	-------	-------	-------	29.96	EXISTING BASIN D
10	SCS Runoff	------	2.342	-------	-------	4.798	-------	-------	-------	13.13	EXISTING BASIN E
11	SCS Runoff	------	2.200	-------	-------	6.942	-------	-------	-------	27.32	PROPOSED BASIN A
12	SCS Runoff	------	6.129	-------	-------	18.52	-------	-------	-------	69.81	PROPOSED BASIN B
13	SCS Runoff	------	1.473	-------	-------	5.958	-------	-------	-------	28.26	PROPOSED BASIN C
14	SCS Runoff	------	1.456	-------	-------	4.016	-------	-------	-------	13.70	PROPOSED BASIN D
15	SCS Runoff	------	1.432	-------	-------	3.487	-------	-------	-------	10.91	PROPOSED BASIN E
16	Reservoir	11	0.861	-------	-------	1.276	-------	-------	-------	3.502	!POND A RELEASE
17	SCS Runoff	------	2.781	-------	-------	8.777	-------	-------	-------	32.34	PROPOSED BASIN B1
18	SCS Runoff	------	2.750	-------	-------	8.407	-------	-------	-------	31.10	PROPOSED BASIN B2
19	SCS Runoff	------	1.178	-------	-------	3.817	-------	-------	-------	14.58	PROPOSED BASIN B3
20	SCS Runoff	------	1.669	-------	-------	5.035	-------	-------	-------	18.11	PROPOSED BASIN B4
21	SCS Runoff	------	0.841	-------	-------	2.557	-------	-------	-------	9.280	PROPOSED BASIN B5
22	SCS Runoff	------	0.908	-------	-------	2.448	-------	-------	-------	8.162	PROPOSED BASIN B (LOTS 10-11)
23	SCS Runoff	------	0.553	-------	-------	1.393	-------	-------	-------	4.506	PROPOSED BASIN B (LOTS 22-23)
24	SCS Runoff	------	1.471	-------	-------	3.967	-------	-------	-------	13.23	PROPOSED BASIN B (LOTS 51-52)
25	SCS Runoff	------	0.479	-------	-------	1.651	-------	-------	-------	6.529	PROPOSED BASIN B (UND TO DAM
26	Reservoir	17	0.562	-------	-------	1.153	-------	-------	-------	10.38	!POND B1 RELEASE
27	Reservoir	18	1.917	-------	-------	4.517	-------	-------	-------	13.57	POND B2 RELEASE
28	Diversion1	1	48.00	-------	-------	48.00	-------	-------	-------	48.00	Pass Through 170th
29	Diversion2	1	14.63	-------	-------	89.32	-------	-------	-------	358.78	Field Storage Volume
30	Reservoir	28	48.00	-------	-------	48.00	-------	-------	-------	48.00	Offsite Field Storage
31	Combine	5, 30	48.00	-------	-------	85.57	-------	-------	-------	185.35	Off-Site B Flow
32	Reach	31	48.00	-------	-------	84.97	-------	-------	-------	185.26	REACH TO DAM
33	Reservoir	19	0.389	-------	-------	0.549	-------	-------	-------	0.829	POND B3 RELEASE
34	SCS Runoff	------	0.838	-------	-------	2.888	-------	-------	-------	11.36	PROPOSED BASIN C1

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
35	Combine	2, 34	2.899	-------	-------	7.403	-------	-------	-------	24.28	FLOW TO POND C1
36	Combine	20, 21,	2.503	-------	-------	7.535	-------	-------	-------	27.26	COMBINE B4 B5
37	Reach	36	1.879	-------	-------	6.271	-------	-------	-------	24.81	REACH TO DAM
38	Combine	23, 25, 27, 32, 37	48.75	-------	-------	86.83	-------	-------	-------	195.69	TOTAL FLOW TO DAM
39	Reservoir	38	48.57	-------	-------	81.93	-------	-------	-------	194.31	!DAM RELEASE
40	SCS Runoff	------	1.830	-------	-------	5.334	-------	-------	-------	18.68	BASIN C2
41	SCS Runoff	------	4.125	-------	-------	13.02	-------	-------	-------	47.97	BASIN C3
42	Combine	3, 35, 40, 41	11.76	-------	-------	31.88	-------	-------	-------	109.07	TOTAL FLOW TO POND C3
43	Reach	42	11.31	-------	-------	31.24	-------	-------	-------	108.52	REACH TO POND C3
44	SCS Runoff	------	2.552	-------	-------	6.662	-------	-------	-------	21.90	!BASIN D1
45	SCS Runoff	------	1.247	-------	-------	3.111	-------	-------	-------	9.933	!BASIN E1
46	Reservoir	43	6.144	-------	-------	11.63	-------	-------	-------	47.14	!POND C3 RELEASE
47	SCS Runoff	------	0.536	-------	-------	4.474	-------	-------	-------	25.09	Proposed Basin A-UND
48	SCS Runoff	------	0.438	-------	-------	3.658	-------	-------	-------	20.51	Proposed Basin B-UND
49	SCS Runoff	------	0.630	-------	-------	5.258	-------	-------	-------	29.49	Proposed Basin C-UND
50	Reservoir	22	0.168	-------	-------	0.375	-------	-------	-------	8.081	INFILTRATION BERM
51	Reservoir	24	0.171	-------	-------	0.375	-------	-------	-------	13.08	INFILTRATION BERM

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	62.63	2	876	1,329,469	------	------	------	Off-Site Basin B (upper)
2	SCS Runoff	2.144	2	726	7,261	------	------	------	Off-Site Basin C1
3	SCS Runoff	4.346	2	736	21,969	------	------	------	Off-Site Basin C2
4	SCS Runoff	26.48	2	786	317,746	------	------	------	Off-Site Basin B (lower)
5	Reservoir	2.254	2	1406	20,096	4	955.93	298,494	Offsite Field Storage
6	SCS Runoff	6.681	2	750	46,690	------	------	------	EXISTING BASIN A
7	SCS Runoff	16.44	2	748	111,203	------	------	------	EXISTING BASIN B
8	SCS Runoff	7.192	2	742	43,450	------	------	------	EXISTING BASIN C
9	SCS Runoff	4.838	2	728	18,283	------	------	------	EXISTING BASIN D
10	SCS Runoff	2.342	2	718	4,735	------	------	------	EXISTING BASIN E
11	SCS Runoff	2.200	2	766	25,080	------	------	------	PROPOSED BASIN A
12	SCS Runoff	6.129	2	758	61,946	------	------	------	PROPOSED BASIN B
13	SCS Runoff	1.473	2	768	18,860	------	------	------	PROPOSED BASIN C
14	SCS Runoff	1.456	2	734	7,637	------	------	------	PROPOSED BASIN D
15	SCS Runoff	1.432	2	720	3,619	------	------	------	PROPOSED BASIN E
16	Reservoir	0.861	2	844	25,068	11	932.26	6,723	!POND A RELEASE
17	SCS Runoff	2.781	2	724	10,925	------	------	------	PROPOSED BASIN B1
18	SCS Runoff	2.750	2	738	17,969	------	------	------	PROPOSED BASIN B2
19	SCS Runoff	1.178	2	734	7,082	------	------	------	PROPOSED BASIN B3
20	SCS Runoff	1.669	2	728	7,186	------	------	------	PROPOSED BASIN B4
21	SCS Runoff	0.841	2	730	4,078	------	------	------	PROPOSED BASIN B5
22	SCS Runoff	0.908	1	721	2,445	------	------	------	PROPOSED BASIN B (LOTS 10-11)
23	SCS Runoff	0.553	2	724	1,831	------	------	------	PROPOSED BASIN B (LOTS 22-23)
24	SCS Runoff	1.471	1	721	3,962	------	------	------	PROPOSED BASIN B (LOTS 51-52)
25	SCS Runoff	0.479	2	732	2,768	------	------	------	PROPOSED BASIN B (UND TO DAM
26	Reservoir	0.562	2	756	9,984	17	934.70	2,716	!POND B1 RELEASE
27	Reservoir	1.917	2	758	16,605	18	938.80	2,818	POND B2 RELEASE
28	Diversion1	48.00	2	828	1,238,636	1	------	------	Pass Through 170th
29	Diversion2	14.63	2	876	90,834	1	------	------	Field Storage Volume
30	Reservoir	48.00	2	926	1,160,110	28	957.83	114,247	Offsite Field Storage
31	Combine	48.00	2	926	1,180,206	5, 30	------	------	Off-Site B Flow
32	Reach	48.00	2	936	1,180,194	31	------	------	REACH TO DAM
33	Reservoir	0.389	2	768	7,078	19	938.11	1,545	POND B3 RELEASE
34	SCS Runoff	0.838	2	730	4,529	------	------	------	PROPOSED BASIN C1

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

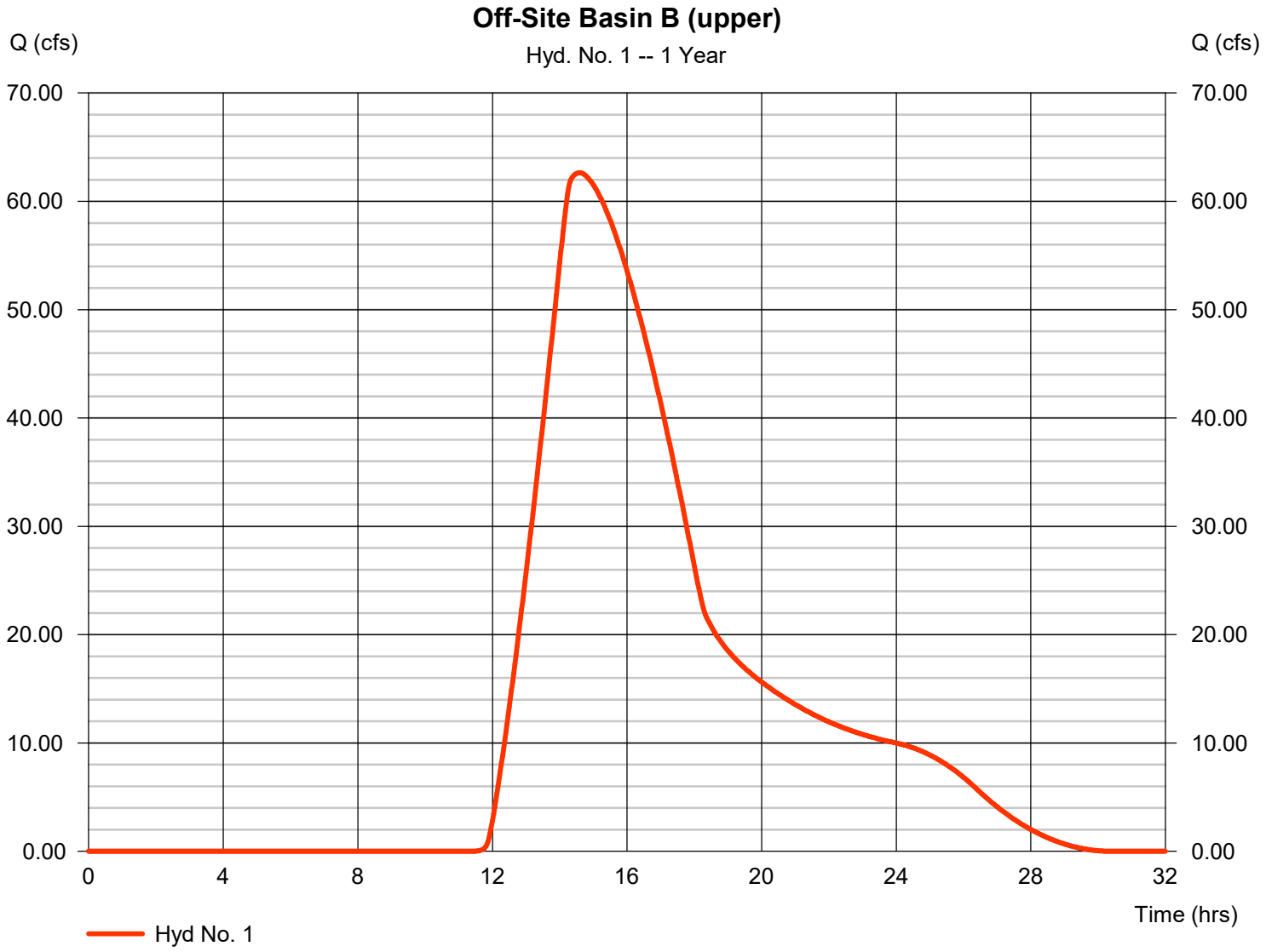
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
35	Combine	2.899	2	726	11,790	2, 34	------	------	FLOW TO POND C1
36	Combine	2.503	2	728	11,264	20, 21,	------	------	COMBINE B4 B5
37	Reach	1.879	2	738	11,257	36	------	------	REACH TO DAM
38	Combine	48.75	2	878	1,212,655	23, 25, 27, 32, 37	------	------	TOTAL FLOW TO DAM
39	Reservoir	48.57	2	962	1,054,492	38	942.70	207,180	!DAM RELEASE
40	SCS Runoff	1.830	2	722	6,125	------	------	------	BASIN C2
41	SCS Runoff	4.125	2	724	16,205	------	------	------	BASIN C3
42	Combine	11.76	2	726	56,089	3, 35, 40, 41	------	------	TOTAL FLOW TO POND C3
43	Reach	11.31	2	730	56,086	42	------	------	REACH TO POND C3
44	SCS Runoff	2.552	2	722	7,876	------	------	------	!BASIN D1
45	SCS Runoff	1.247	2	722	3,732	------	------	------	!BASIN E1
46	Reservoir	6.144	2	752	56,083	43	938.07	7,990	!POND C3 RELEASE
47	SCS Runoff	0.536	2	726	4,691	------	------	------	Proposed Basin A-UND
48	SCS Runoff	0.438	2	726	3,835	------	------	------	Proposed Basin B-UND
49	SCS Runoff	0.630	2	726	5,513	------	------	------	Proposed Basin C-UND
50	Reservoir	0.168	1	734	1,957	22	945.48	575	INFILTRATION BERM
51	Reservoir	0.171	1	749	2,775	24	940.48	1,065	INFILTRATION BERM

Hydrograph Report

Hyd. No. 1

Off-Site Basin B (upper)

Hydrograph type	= SCS Runoff	Peak discharge	= 62.63 cfs
Storm frequency	= 1 yrs	Time to peak	= 14.60 hrs
Time interval	= 2 min	Hyd. volume	= 1,329,469 cuft
Drainage area	= 487.010 ac	Curve number	= 75
Basin Slope	= 0.8 %	Hydraulic length	= 8797 ft
Tc method	= LAG	Time of conc. (Tc)	= 243.10 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

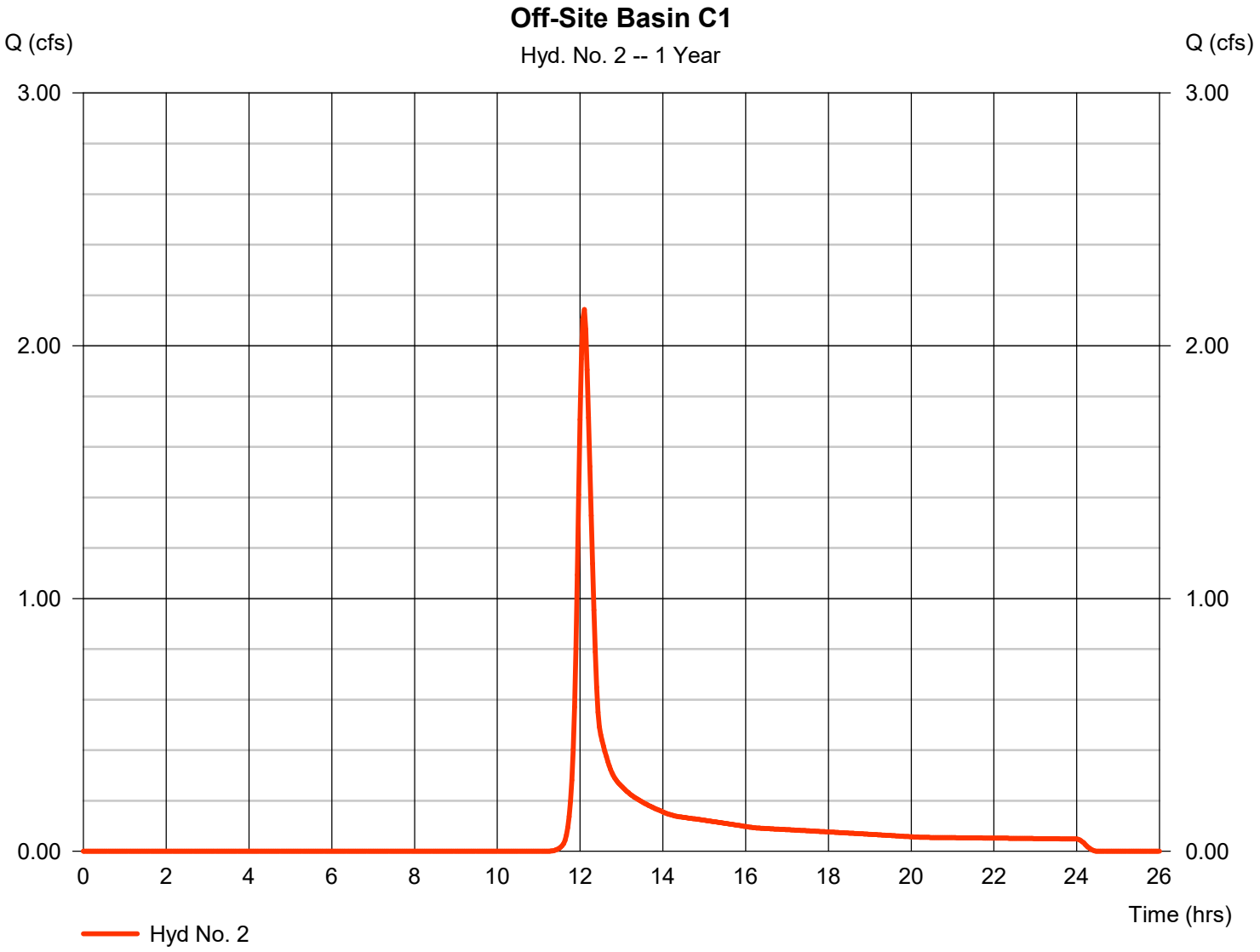


Hydrograph Report

Hyd. No. 2

Off-Site Basin C1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.144 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 7,261 cuft
Drainage area	= 2.660 ac	Curve number	= 75
Basin Slope	= 0.8 %	Hydraulic length	= 392 ft
Tc method	= LAG	Time of conc. (Tc)	= 20.10 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

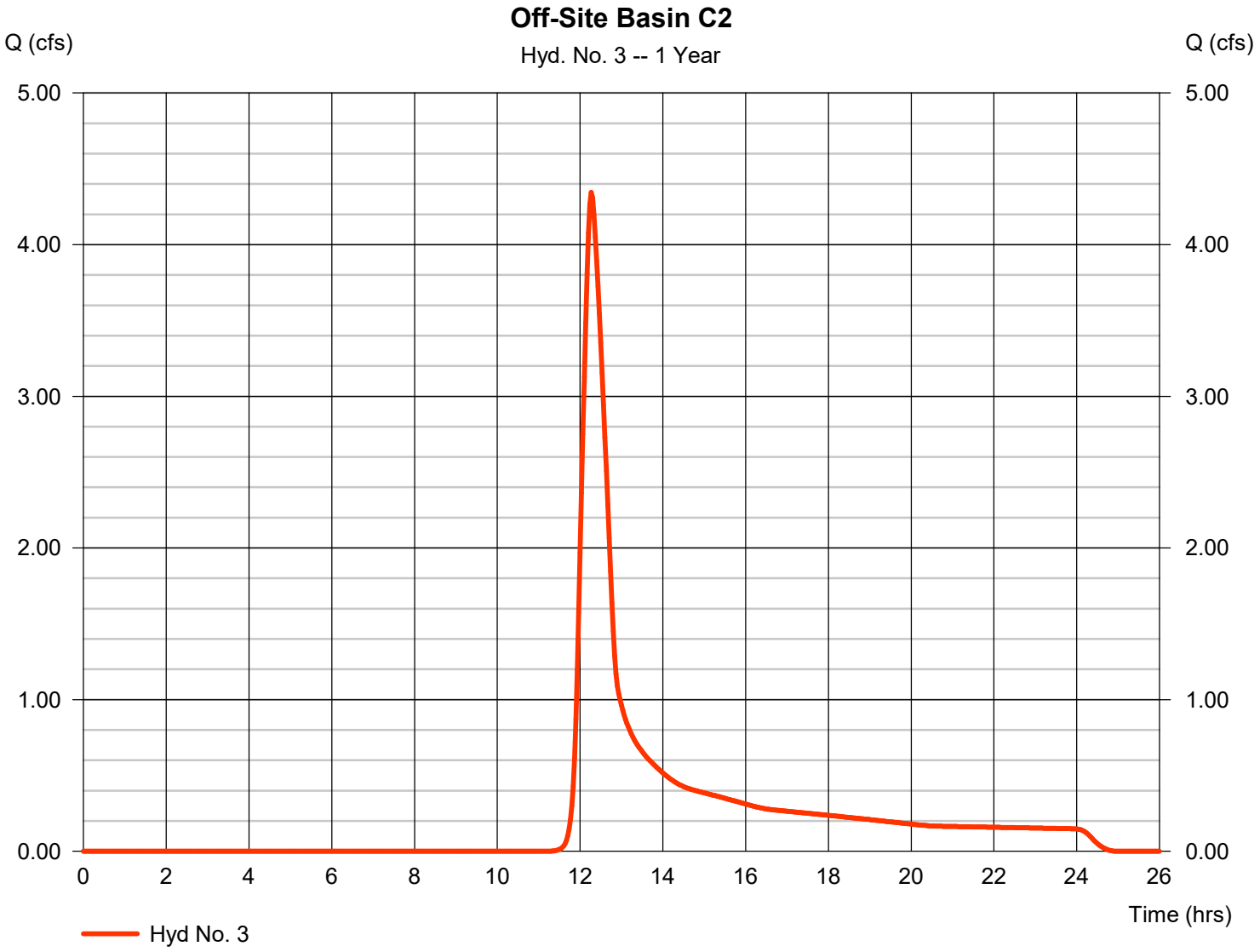


Hydrograph Report

Hyd. No. 3

Off-Site Basin C2

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.346 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.27 hrs
Time interval	=	2 min	Hyd. volume	=	21,969 cuft
Drainage area	=	8.140 ac	Curve number	=	75
Basin Slope	=	0.8 %	Hydraulic length	=	820 ft
Tc method	=	LAG	Time of conc. (Tc)	=	36.40 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

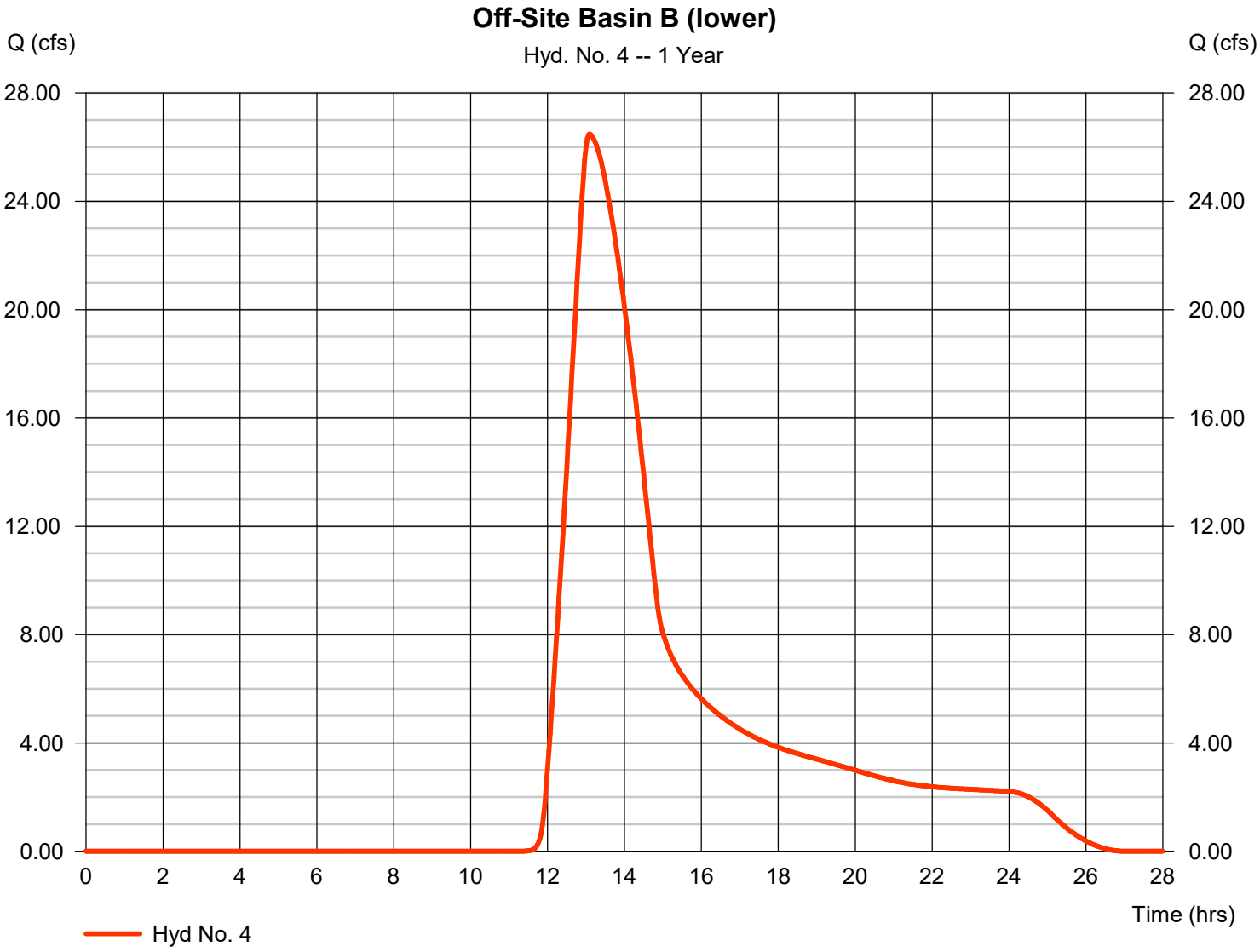


Hydrograph Report

Hyd. No. 4

Off-Site Basin B (lower)

Hydrograph type	=	SCS Runoff	Peak discharge	=	26.48 cfs
Storm frequency	=	1 yrs	Time to peak	=	13.10 hrs
Time interval	=	2 min	Hyd. volume	=	317,746 cuft
Drainage area	=	115.970 ac	Curve number	=	75
Basin Slope	=	0.8 %	Hydraulic length	=	3400 ft
Tc method	=	LAG	Time of conc. (Tc)	=	113.60 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



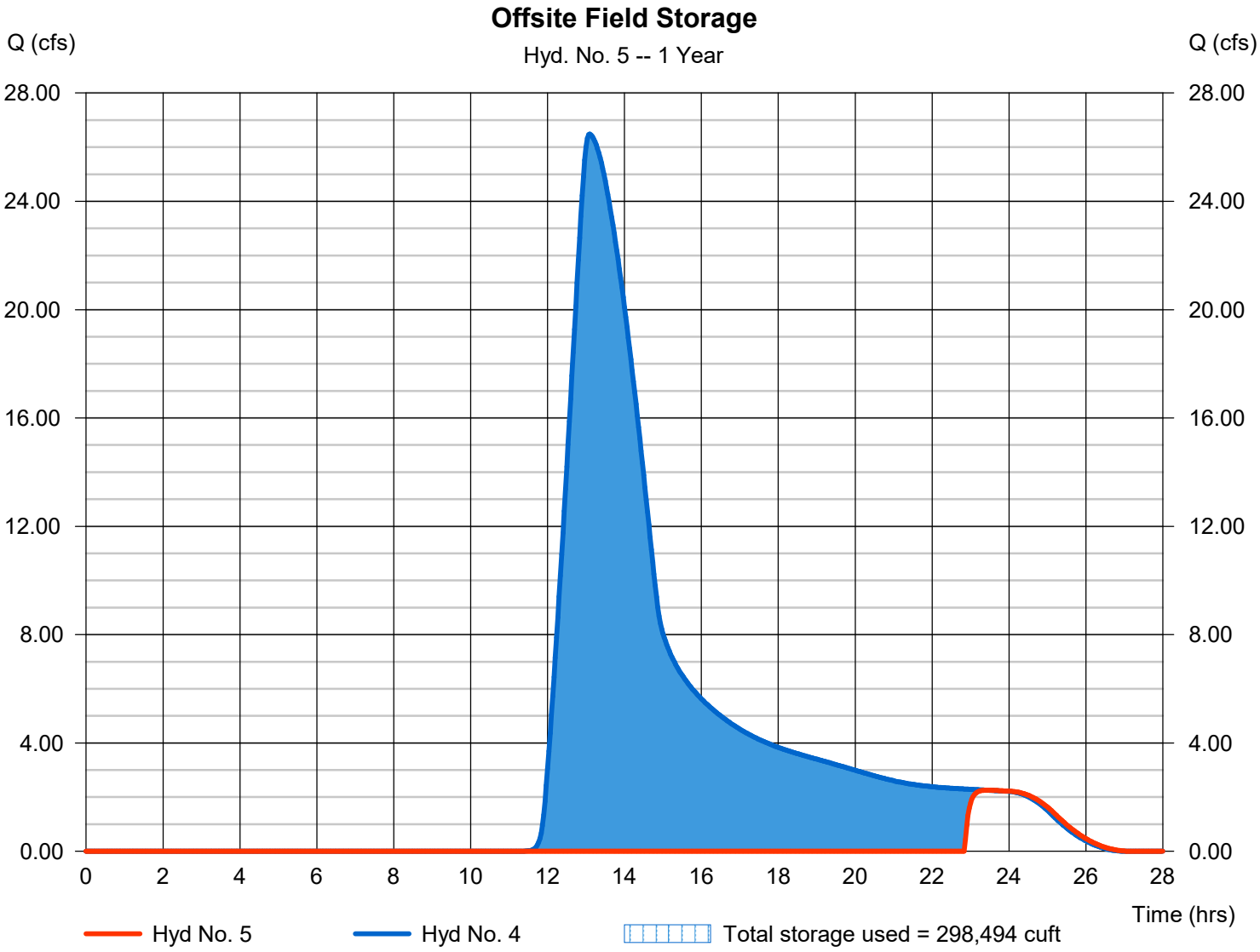
Hydrograph Report

Hyd. No. 5

Offsite Field Storage

Hydrograph type	= Reservoir	Peak discharge	= 2.254 cfs
Storm frequency	= 1 yrs	Time to peak	= 23.43 hrs
Time interval	= 2 min	Hyd. volume	= 20,096 cuft
Inflow hyd. No.	= 4 - Off-Site Basin B (lower)	Max. Elevation	= 955.93 ft
Reservoir name	= Offsite Field Storage LOWER	Max. Storage	= 298,494 cuft

Storage Indication method used.



Pond Report

Pond No. 12 - Offsite Field Storage LOWER

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 955.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	955.00	196,750	0	0
1.00	957.00	486,220	330,722	330,722
2.00	958.00	1,109,149	776,500	1,107,222

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 75.00	0.00	0.00	0.00
Crest El. (ft)	= 956.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Ciplti	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

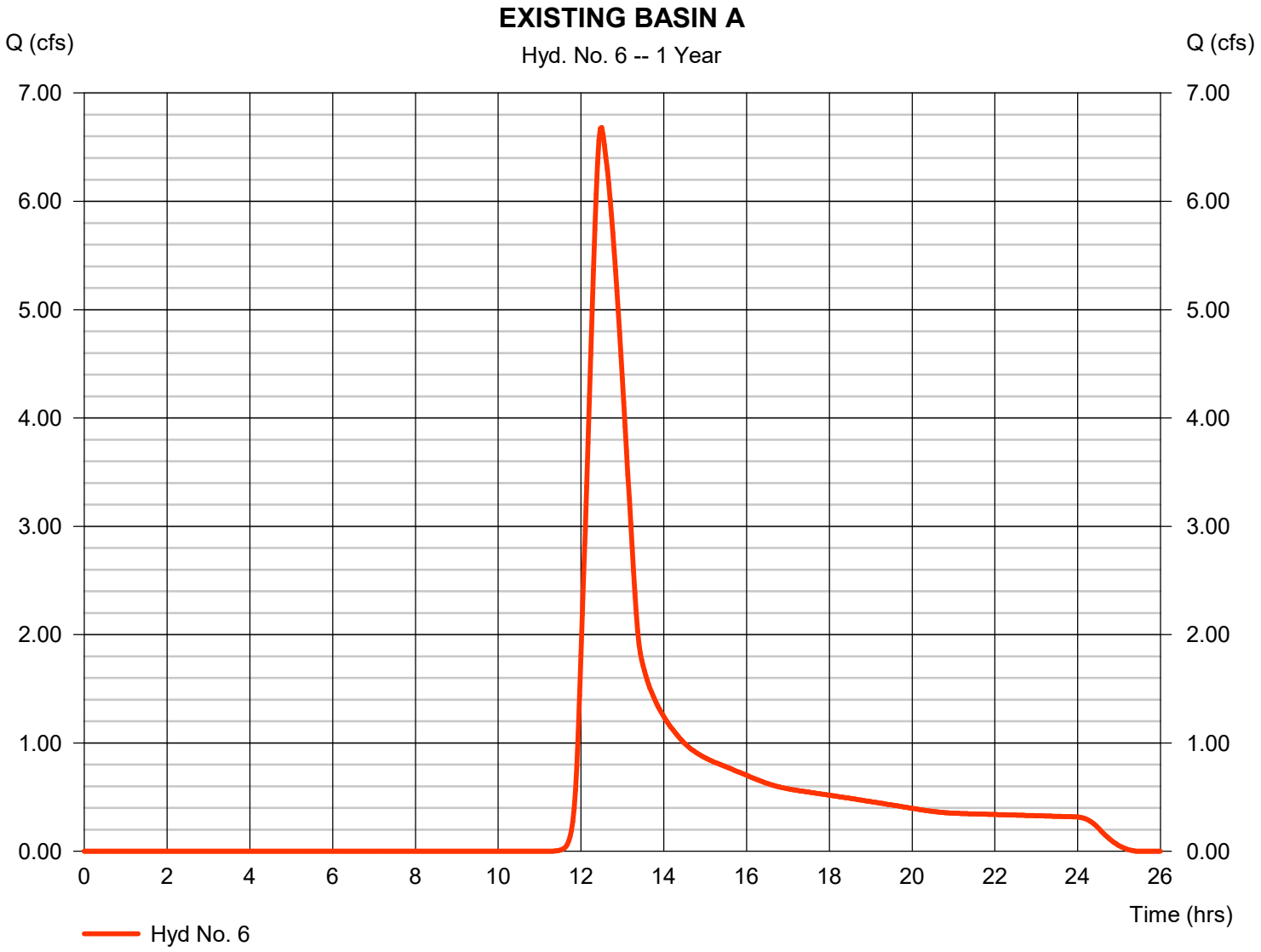
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	955.00	---	---	---	---	0.00	---	---	---	---	---	0.000
1.00	330,722	957.00	---	---	---	---	88.30	---	---	---	---	---	88.30
2.00	1,107,222	958.00	---	---	---	---	458.82	---	---	---	---	---	458.82

Hydrograph Report

Hyd. No. 6

EXISTING BASIN A

Hydrograph type	= SCS Runoff	Peak discharge	= 6.681 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.50 hrs
Time interval	= 2 min	Hyd. volume	= 46,690 cuft
Drainage area	= 17.230 ac	Curve number	= 75
Basin Slope	= 1.8 %	Hydraulic length	= 2500 ft
Tc method	= LAG	Time of conc. (Tc)	= 57.00 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

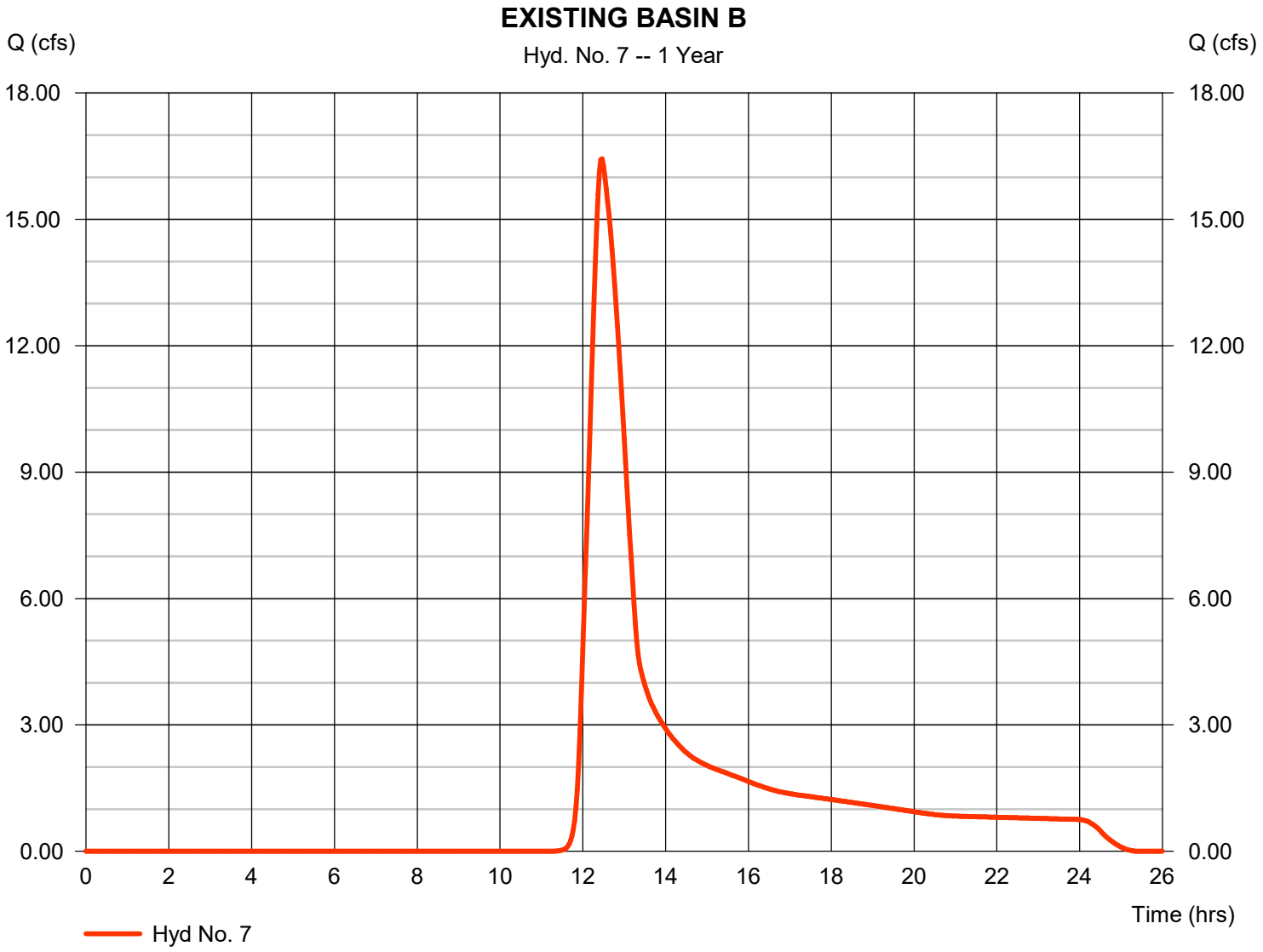


Hydrograph Report

Hyd. No. 7

EXISTING BASIN B

Hydrograph type	=	SCS Runoff	Peak discharge	=	16.44 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.47 hrs
Time interval	=	2 min	Hyd. volume	=	111,203 cuft
Drainage area	=	40.420 ac	Curve number	=	75
Basin Slope	=	1.1 %	Hydraulic length	=	1712 ft
Tc method	=	LAG	Time of conc. (Tc)	=	53.40 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

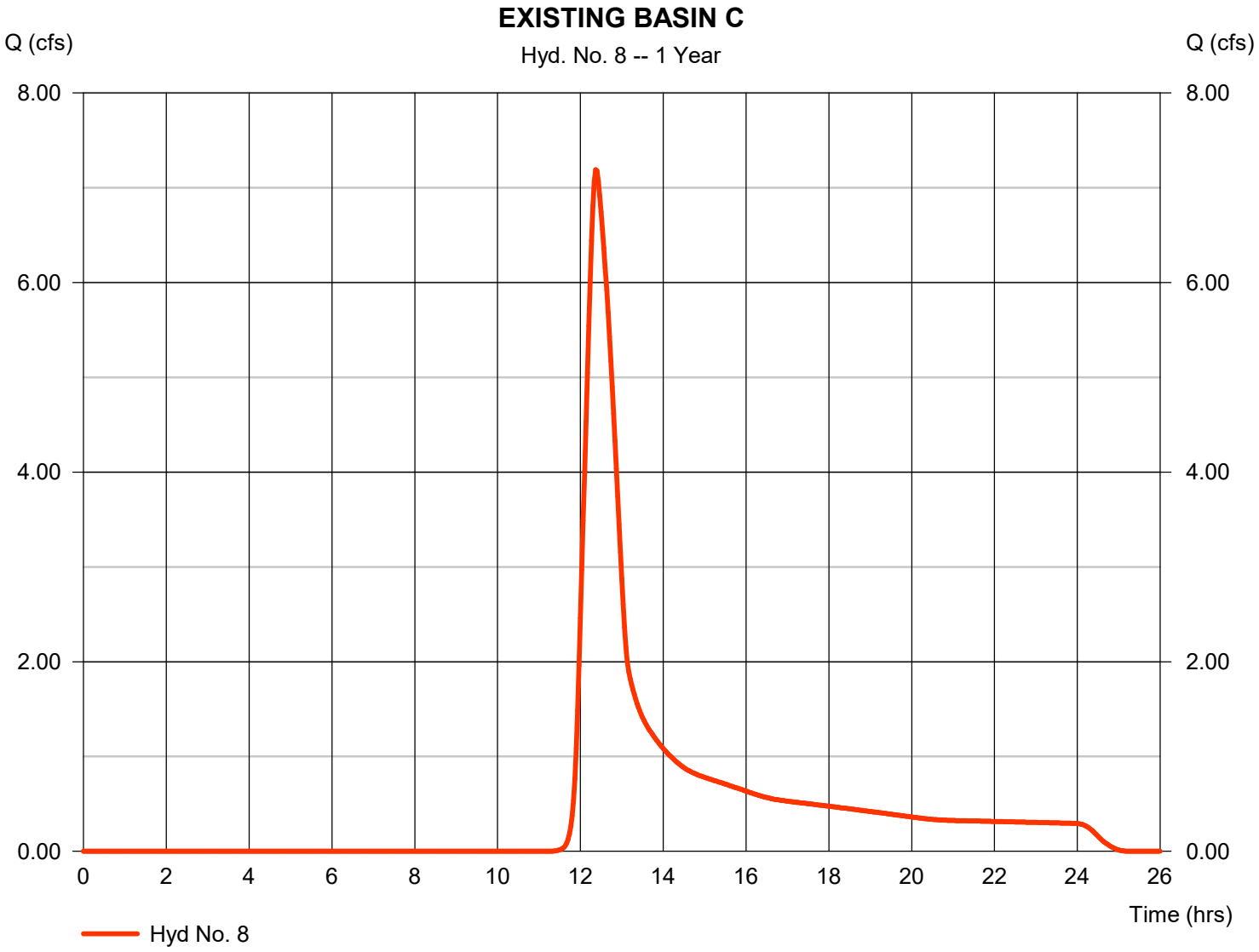


Hydrograph Report

Hyd. No. 8

EXISTING BASIN C

Hydrograph type	= SCS Runoff	Peak discharge	= 7.192 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.37 hrs
Time interval	= 2 min	Hyd. volume	= 43,450 cuft
Drainage area	= 16.060 ac	Curve number	= 75
Basin Slope	= 1.8 %	Hydraulic length	= 1825 ft
Tc method	= LAG	Time of conc. (Tc)	= 44.10 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

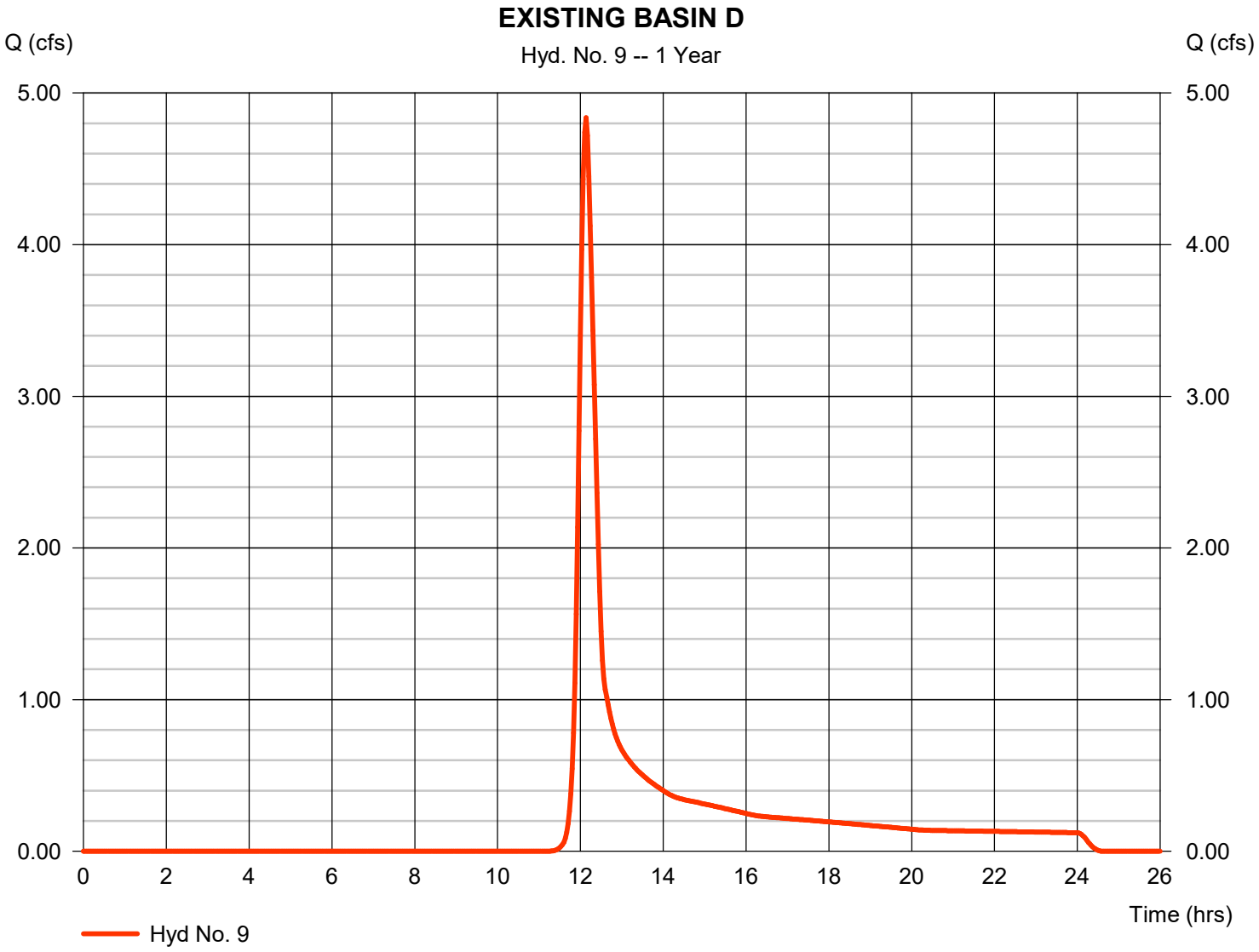


Hydrograph Report

Hyd. No. 9

EXISTING BASIN D

Hydrograph type	= SCS Runoff	Peak discharge	= 4.838 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 18,283 cuft
Drainage area	= 6.580 ac	Curve number	= 75
Basin Slope	= 2.4 %	Hydraulic length	= 970 ft
Tc method	= LAG	Time of conc. (Tc)	= 23.40 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

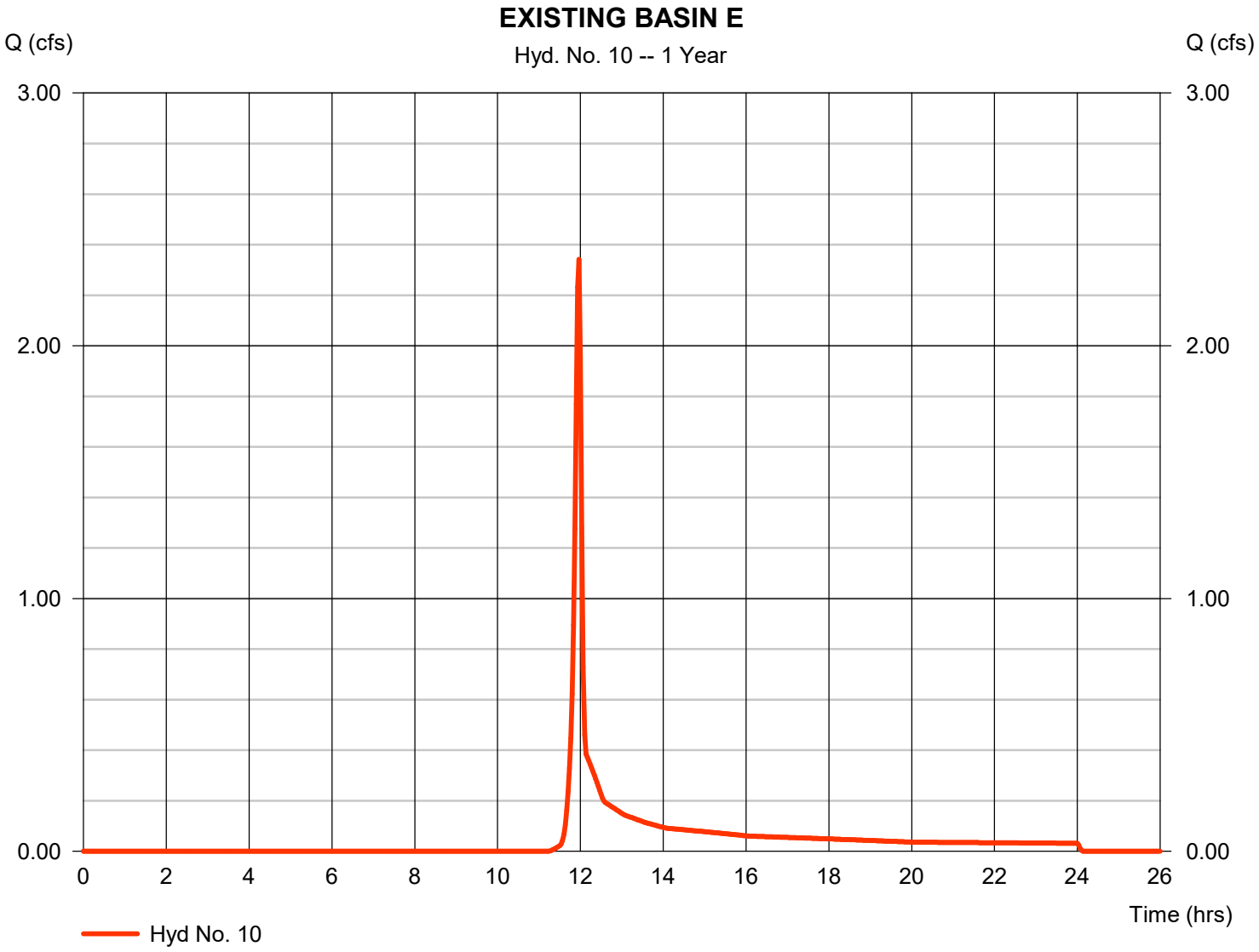


Hydrograph Report

Hyd. No. 10

EXISTING BASIN E

Hydrograph type	= SCS Runoff	Peak discharge	= 2.342 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 4,735 cuft
Drainage area	= 1.850 ac	Curve number	= 75
Basin Slope	= 2.1 %	Hydraulic length	= 175 ft
Tc method	= LAG	Time of conc. (Tc)	= 6.20 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

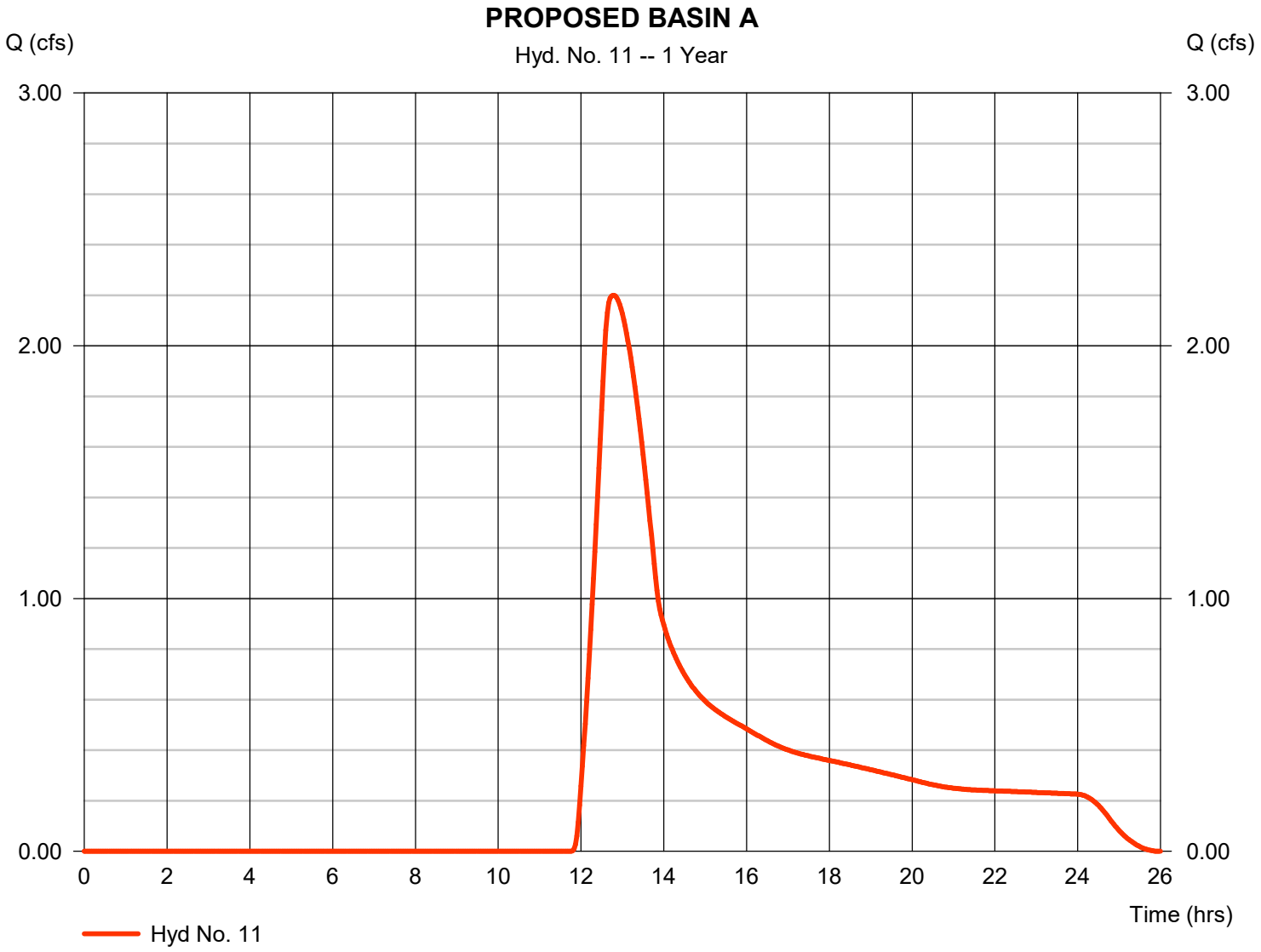


Hydrograph Report

Hyd. No. 11

PROPOSED BASIN A

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.200 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.77 hrs
Time interval	=	2 min	Hyd. volume	=	25,080 cuft
Drainage area	=	17.360 ac	Curve number	=	66
Basin Slope	=	1.8 %	Hydraulic length	=	2500 ft
Tc method	=	LAG	Time of conc. (Tc)	=	72.80 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

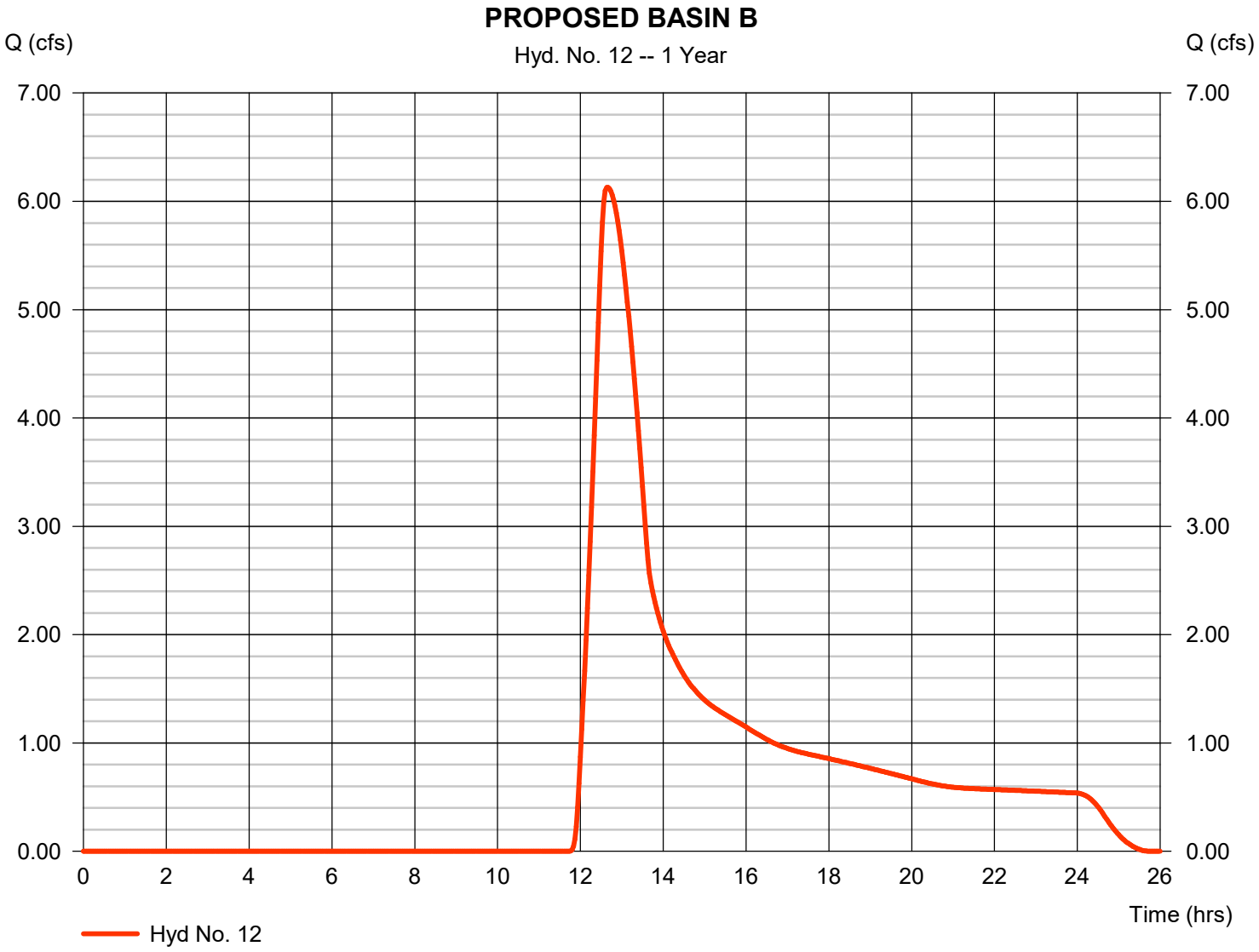


Hydrograph Report

Hyd. No. 12

PROPOSED BASIN B

Hydrograph type	= SCS Runoff	Peak discharge	= 6.129 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.63 hrs
Time interval	= 2 min	Hyd. volume	= 61,946 cuft
Drainage area	= 39.990 ac	Curve number	= 67
Basin Slope	= 1.1 %	Hydraulic length	= 1712 ft
Tc method	= LAG	Time of conc. (Tc)	= 66.50 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

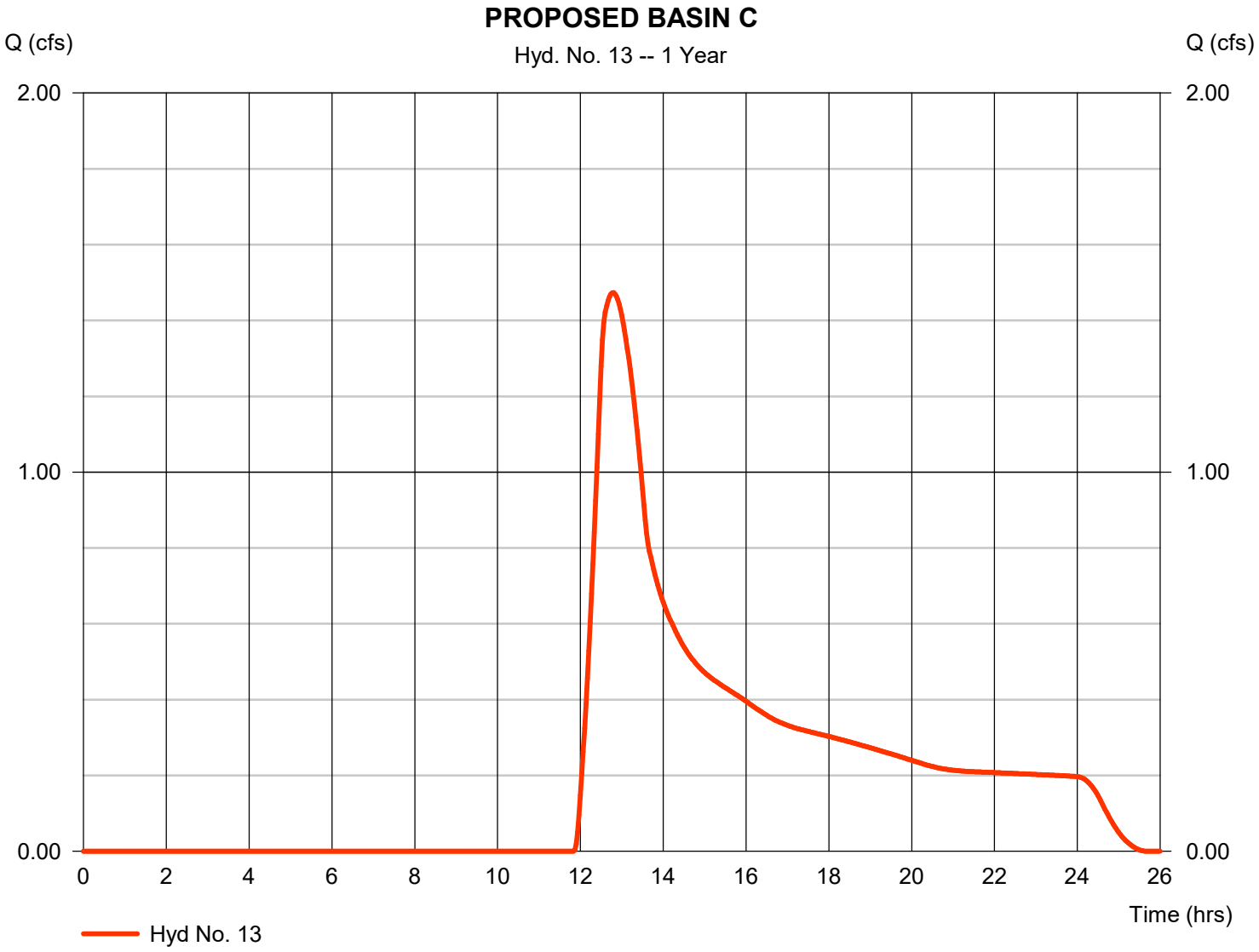


Hydrograph Report

Hyd. No. 13

PROPOSED BASIN C

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.473 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.80 hrs
Time interval	=	2 min	Hyd. volume	=	18,860 cuft
Drainage area	=	18.750 ac	Curve number	=	62
Basin Slope	=	1.8 %	Hydraulic length	=	1825 ft
Tc method	=	LAG	Time of conc. (Tc)	=	62.40 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

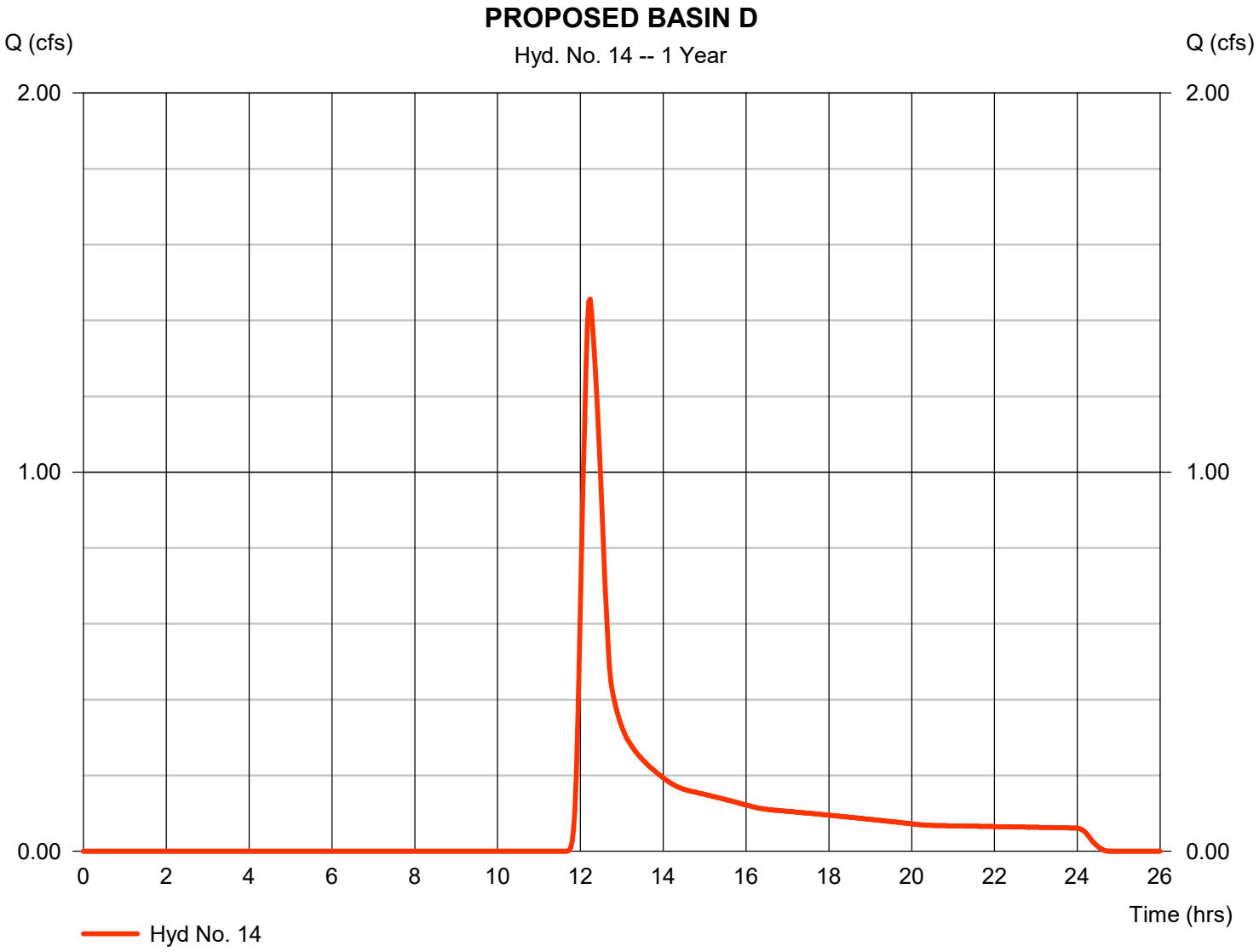


Hydrograph Report

Hyd. No. 14

PROPOSED BASIN D

Hydrograph type	= SCS Runoff	Peak discharge	= 1.456 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 7,637 cuft
Drainage area	= 4.200 ac	Curve number	= 69
Basin Slope	= 2.4 %	Hydraulic length	= 970 ft
Tc method	= LAG	Time of conc. (Tc)	= 27.60 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

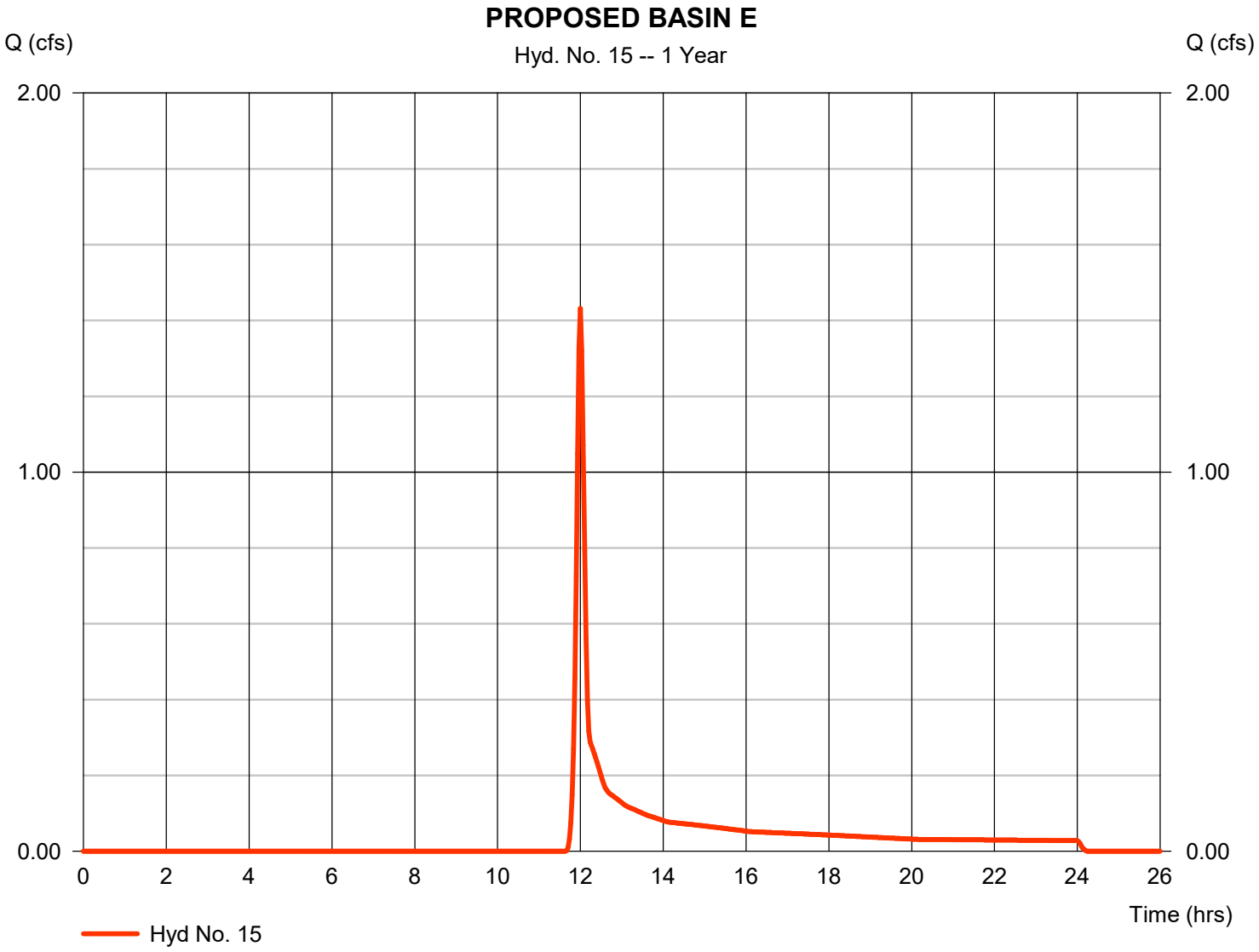


Hydrograph Report

Hyd. No. 15

PROPOSED BASIN E

Hydrograph type	= SCS Runoff	Peak discharge	= 1.432 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 3,619 cuft
Drainage area	= 1.850 ac	Curve number	= 70
Basin Slope	= 2.1 %	Hydraulic length	= 175 ft
Tc method	= LAG	Time of conc. (Tc)	= 7.20 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



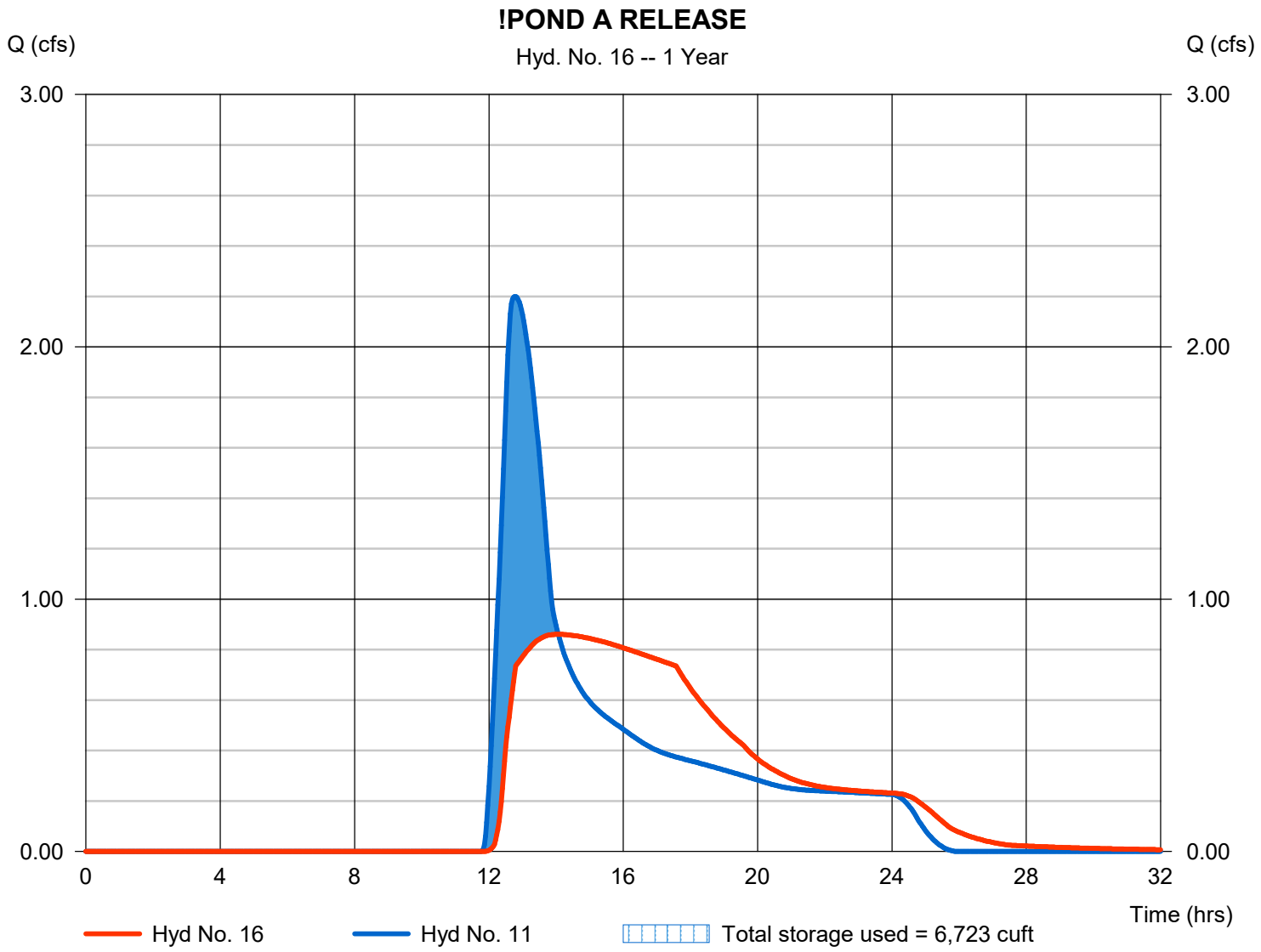
Hydrograph Report

Hyd. No. 16

!POND A RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	0.861 cfs
Storm frequency	=	1 yrs	Time to peak	=	14.07 hrs
Time interval	=	2 min	Hyd. volume	=	25,068 cuft
Inflow hyd. No.	=	11 - PROPOSED BASIN A	Max. Elevation	=	932.26 ft
Reservoir name	=	POND A	Max. Storage	=	6,723 cuft

Storage Indication method used.



Pond No. 2 - POND A

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 931.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	931.00	530	0	0
1.00	932.00	7,030	3,163	3,163
2.00	933.00	21,210	13,482	16,645
3.00	934.00	37,060	28,766	45,411
4.00	935.00	54,030	45,275	90,686
5.00	936.00	69,960	61,818	152,504
6.00	937.00	82,700	76,234	228,737

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	6.00	8.00	0.00
Span (in)	= 15.00	6.00	8.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 931.00	931.00	934.00	0.00
Length (ft)	= 100.00	5.00	5.00	0.00
Slope (%)	= 1.00	1.00	1.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.28	0.00	0.00	0.00
Crest El. (ft)	= 936.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

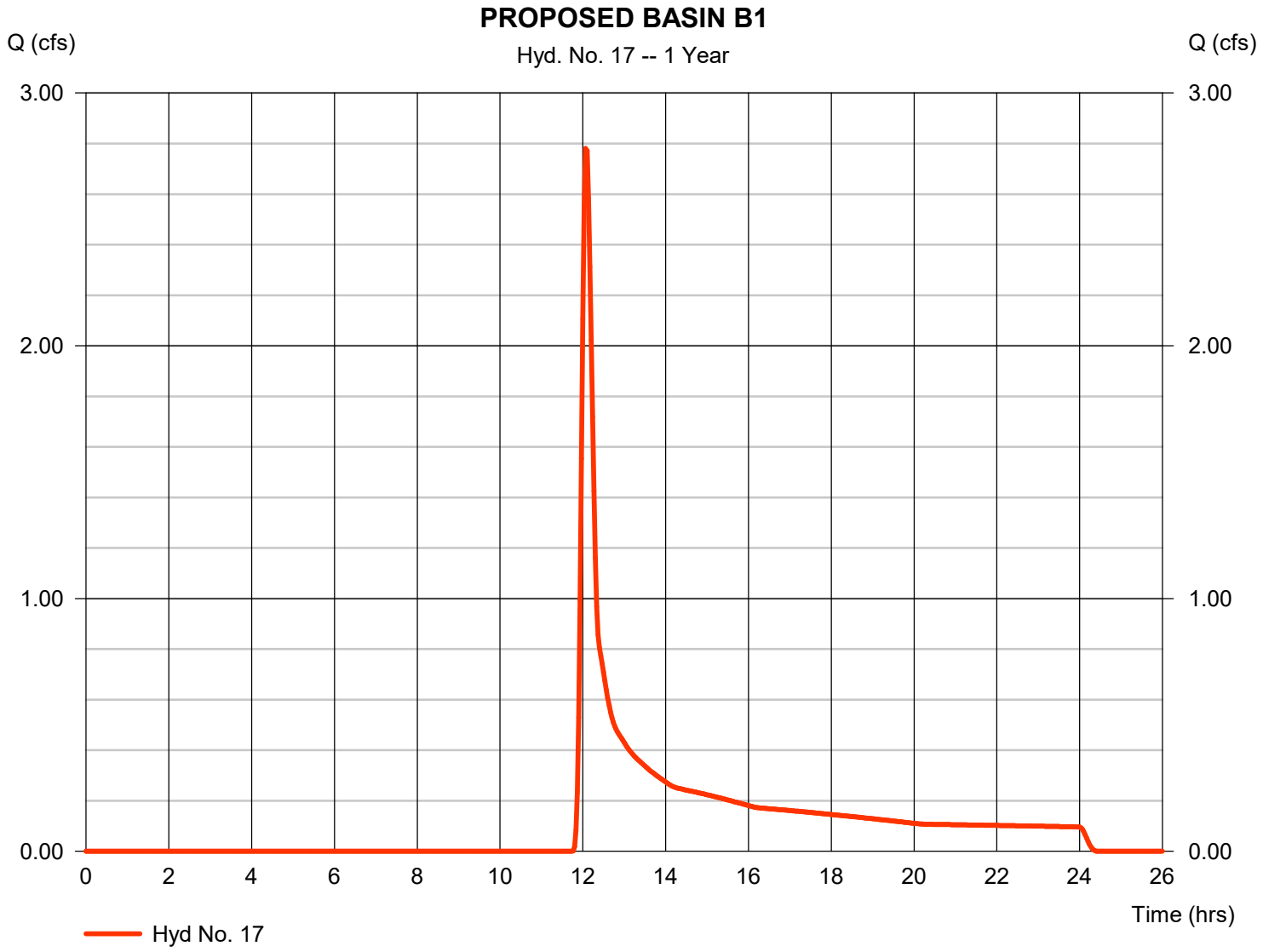
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	931.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
1.00	3,163	932.00	0.74 ic	0.73 ic	0.00	---	0.00	---	---	---	---	---	0.735
2.00	16,645	933.00	1.16 ic	1.15 ic	0.00	---	0.00	---	---	---	---	---	1.155
3.00	45,411	934.00	1.47 ic	1.47 ic	0.00	---	0.00	---	---	---	---	---	1.469
4.00	90,686	935.00	3.04 ic	1.67 ic	1.37 ic	---	0.00	---	---	---	---	---	3.039
5.00	152,504	936.00	4.04 ic	1.87 ic	2.17 ic	---	0.00	---	---	---	---	---	4.039
6.00	228,737	937.00	11.97 oc	0.34 ic	0.61 ic	---	11.02 s	---	---	---	---	---	11.97

Hydrograph Report

Hyd. No. 17

PROPOSED BASIN B1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.781 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 10,925 cuft
Drainage area	= 7.800 ac	Curve number	= 66
Basin Slope	= 6.5 %	Hydraulic length	= 760 ft
Tc method	= LAG	Time of conc. (Tc)	= 14.80 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hyd. No. 18

PROPOSED BASIN B2

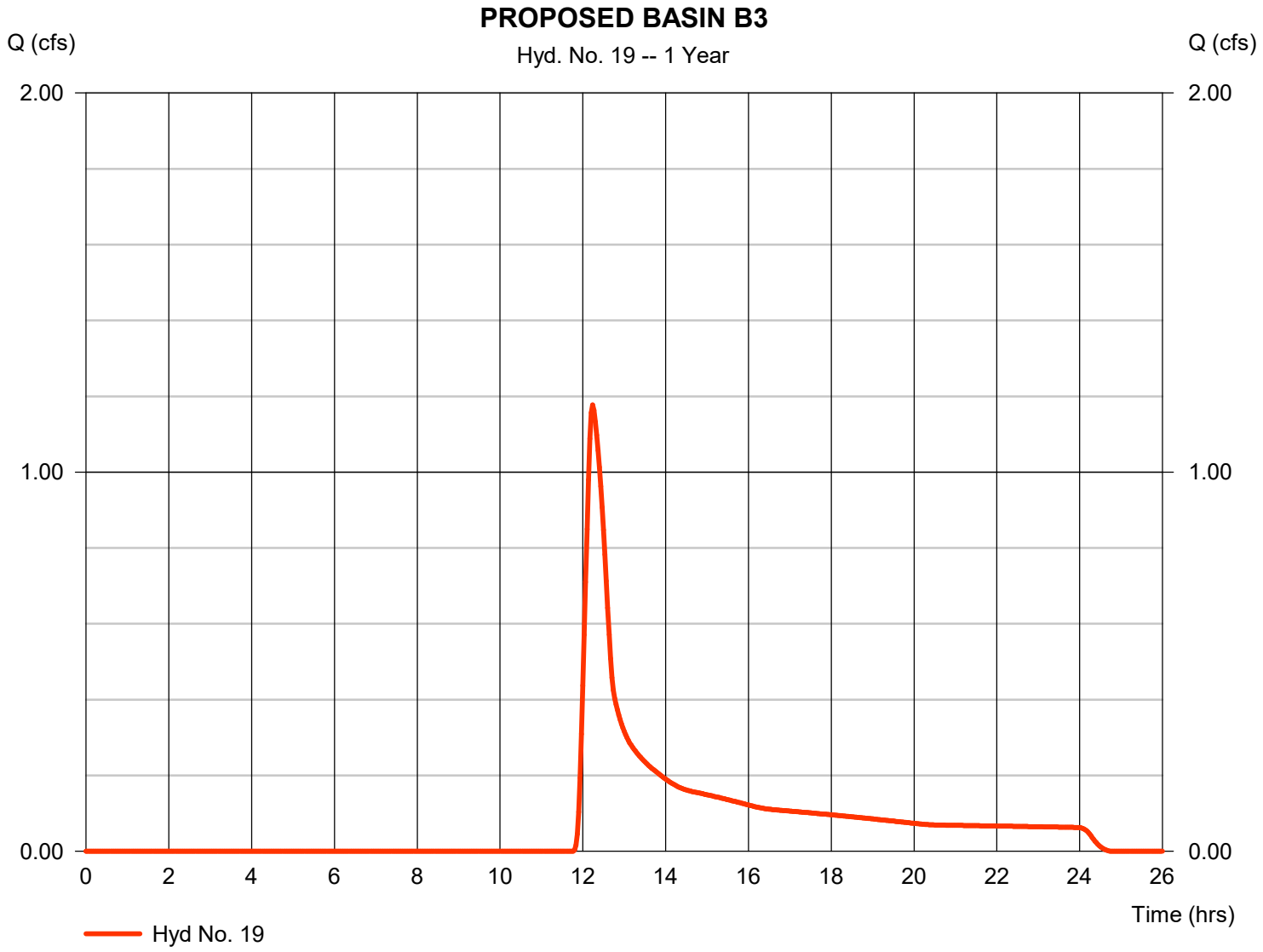
Hydrograph type	=	SCS Runoff	Peak discharge	=	2.750 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.30 hrs
Time interval	=	2 min	Hyd. volume	=	17,969 cuft
Drainage area	=	11.660 ac	Curve number	=	67
Basin Slope	=	3.5 %	Hydraulic length	=	1500 ft
Tc method	=	LAG	Time of conc. (Tc)	=	34.00 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

Hydrograph Report

Hyd. No. 19

PROPOSED BASIN B3

Hydrograph type	= SCS Runoff	Peak discharge	= 1.178 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 7,082 cuft
Drainage area	= 4.930 ac	Curve number	= 66
Basin Slope	= 2.7 %	Hydraulic length	= 950 ft
Tc method	= LAG	Time of conc. (Tc)	= 27.30 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

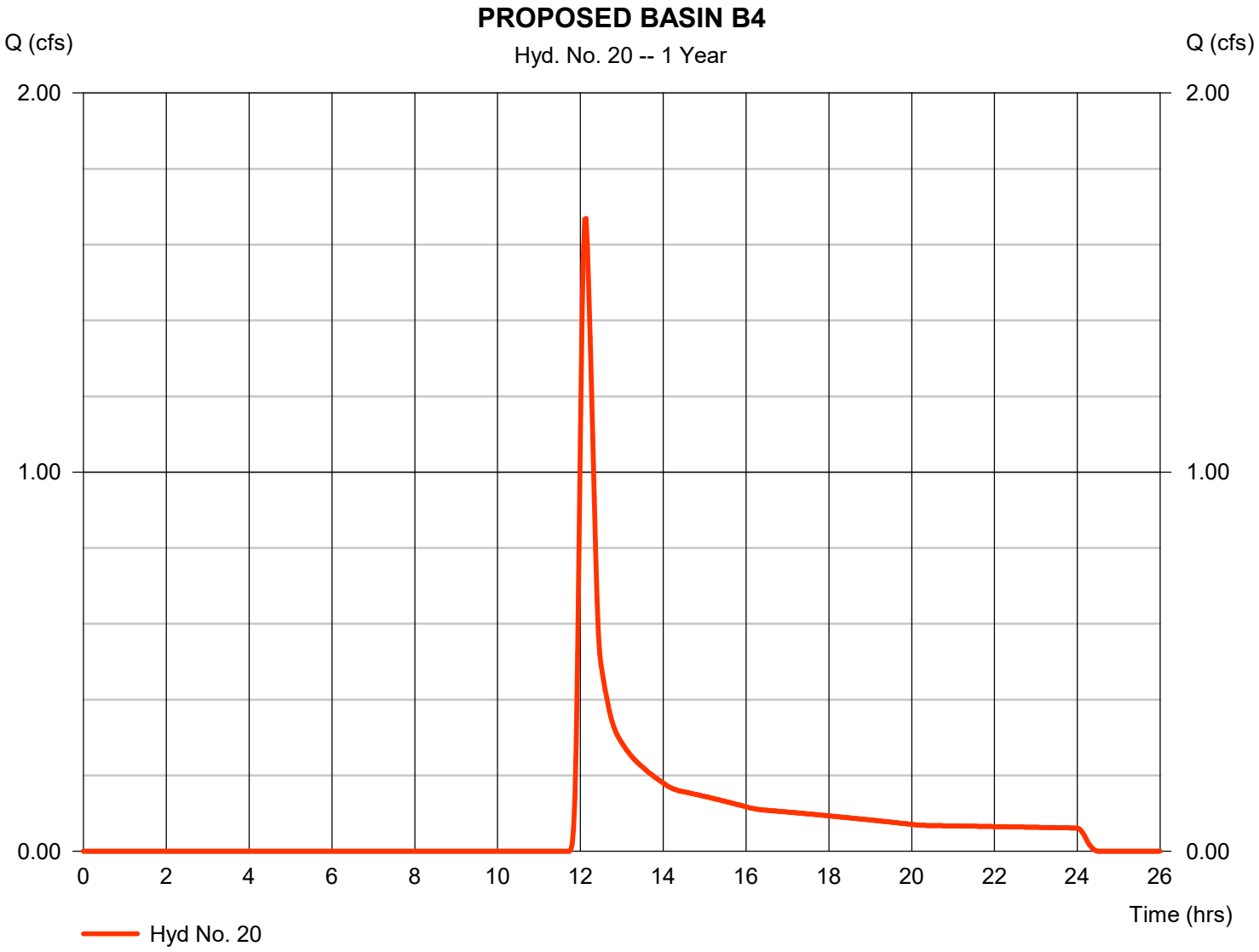


Hydrograph Report

Hyd. No. 20

PROPOSED BASIN B4

Hydrograph type	= SCS Runoff	Peak discharge	= 1.669 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 7,186 cuft
Drainage area	= 4.610 ac	Curve number	= 67
Basin Slope	= 4.1 %	Hydraulic length	= 780 ft
Tc method	= LAG	Time of conc. (Tc)	= 18.60 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

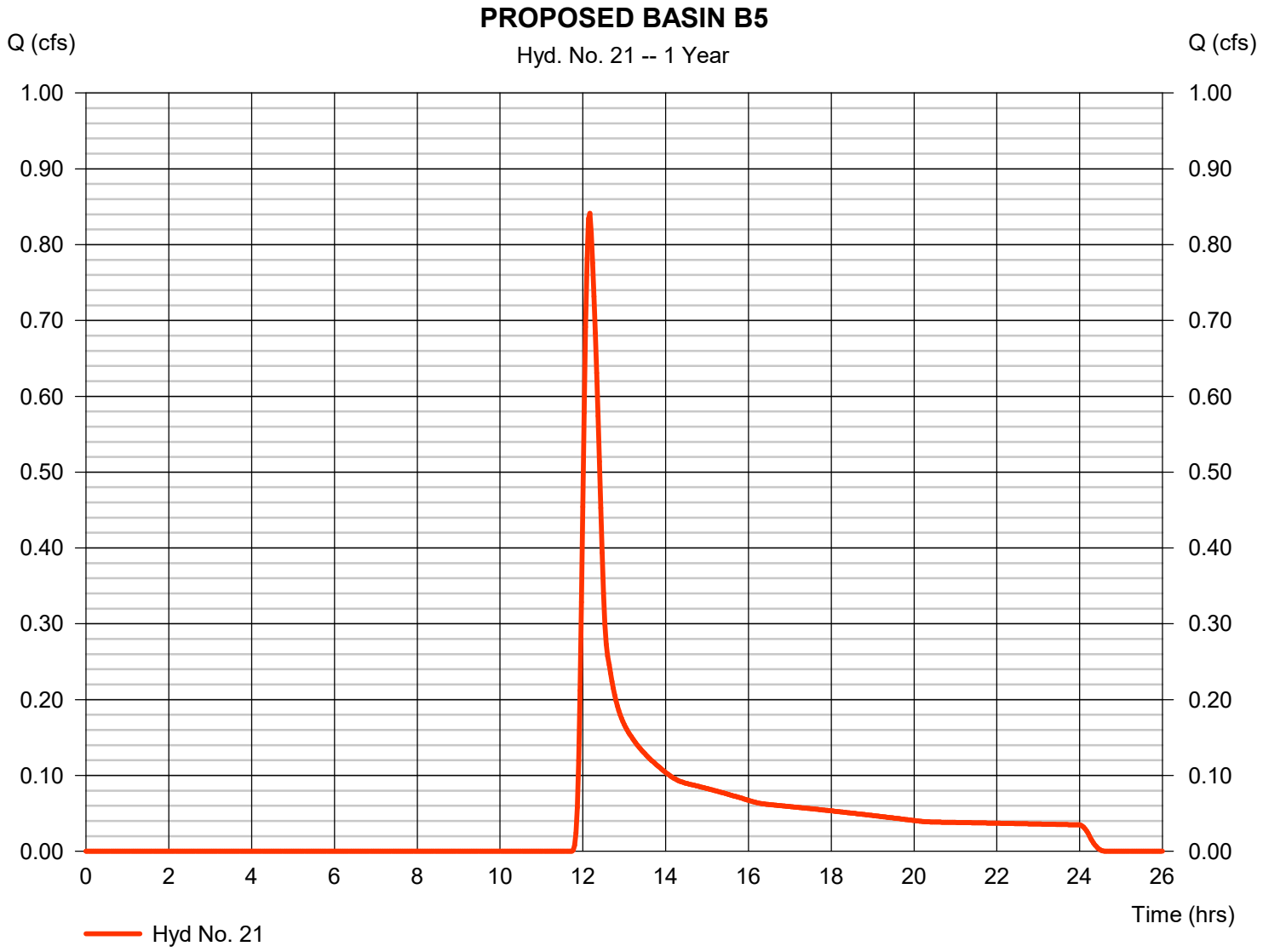


Hydrograph Report

Hyd. No. 21

PROPOSED BASIN B5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.841 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 4,078 cuft
Drainage area	= 2.570 ac	Curve number	= 67
Basin Slope	= 2.5 %	Hydraulic length	= 750 ft
Tc method	= LAG	Time of conc. (Tc)	= 23.10 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

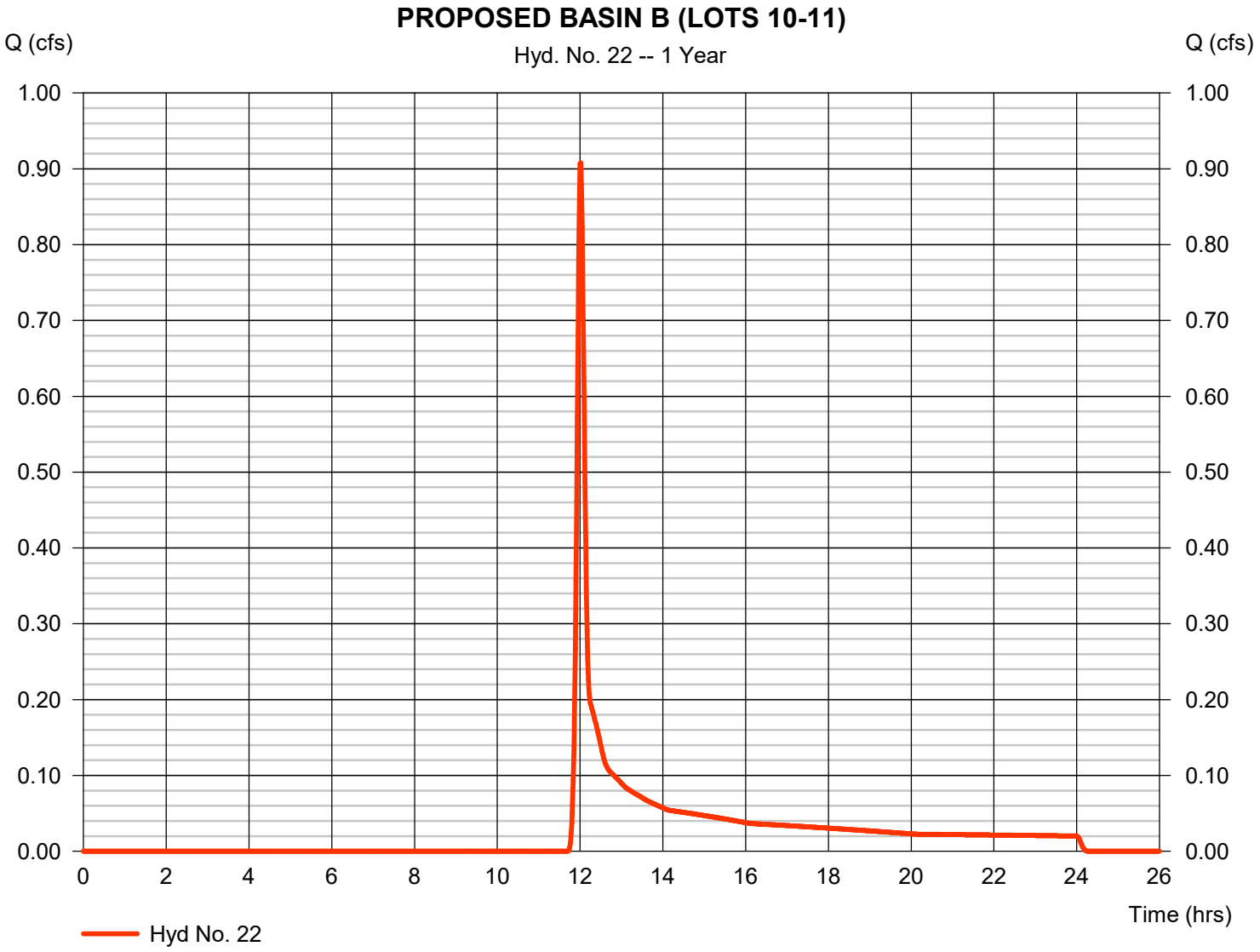


Hydrograph Report

Hyd. No. 22

PROPOSED BASIN B (LOTS 10-11)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.908 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 2,445 cuft
Drainage area	= 1.450 ac	Curve number	= 68
Basin Slope	= 2.0 %	Hydraulic length	= 100 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

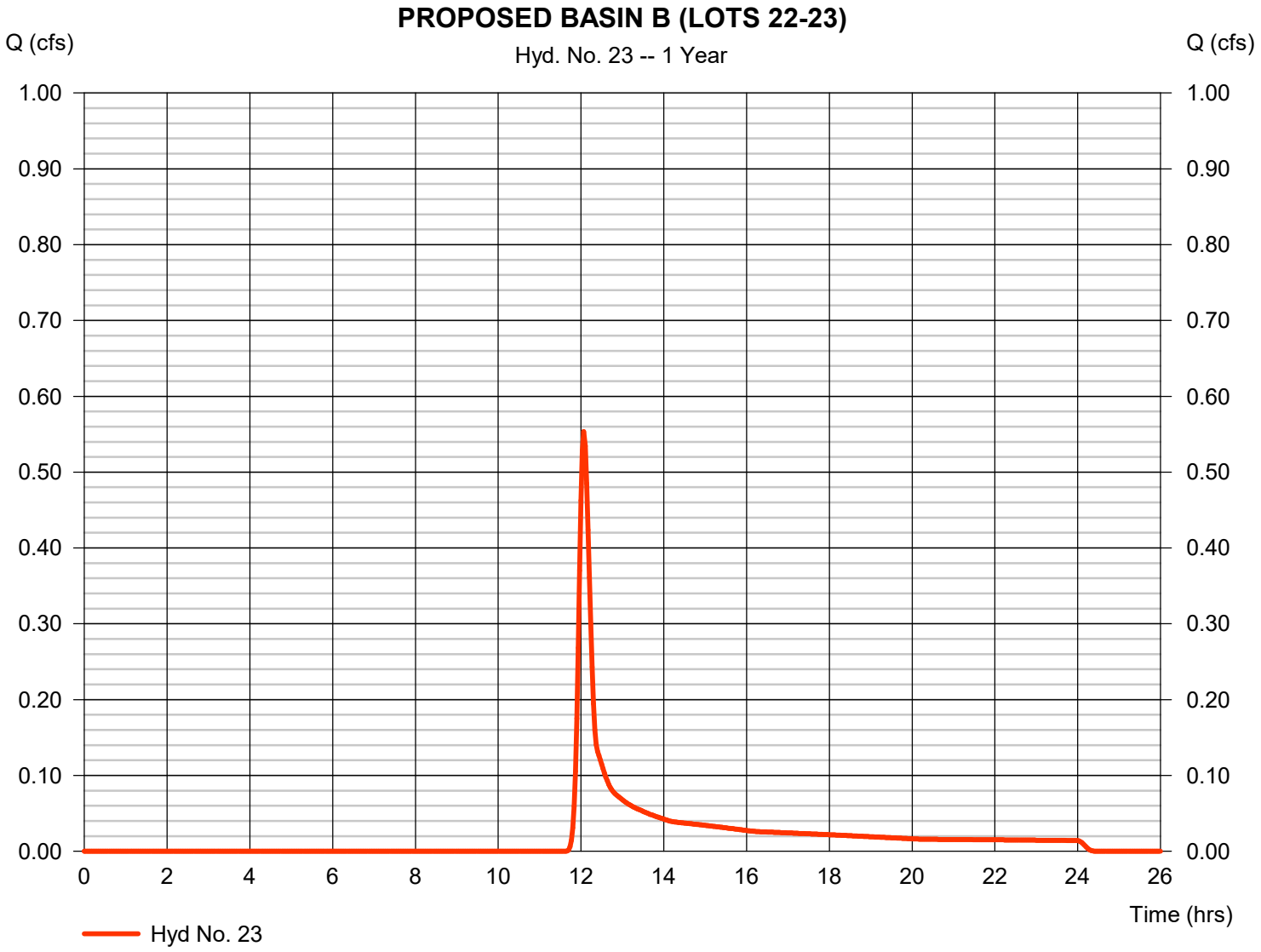


Hydrograph Report

Hyd. No. 23

PROPOSED BASIN B (LOTS 22-23)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.553 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	1,831 cuft
Drainage area	=	0.960 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.00 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

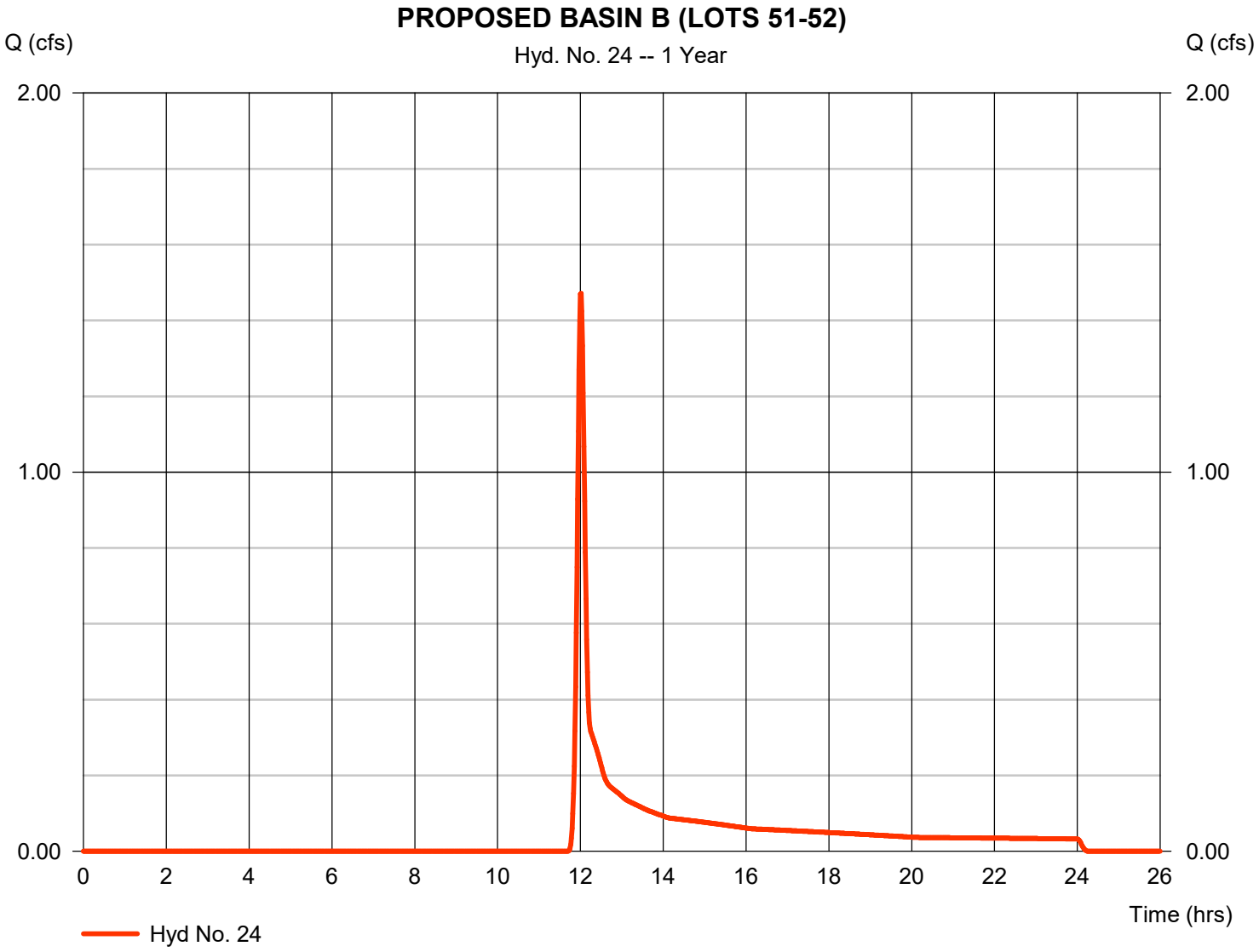


Hydrograph Report

Hyd. No. 24

PROPOSED BASIN B (LOTS 51-52)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.471 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 3,962 cuft
Drainage area	= 2.350 ac	Curve number	= 68
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

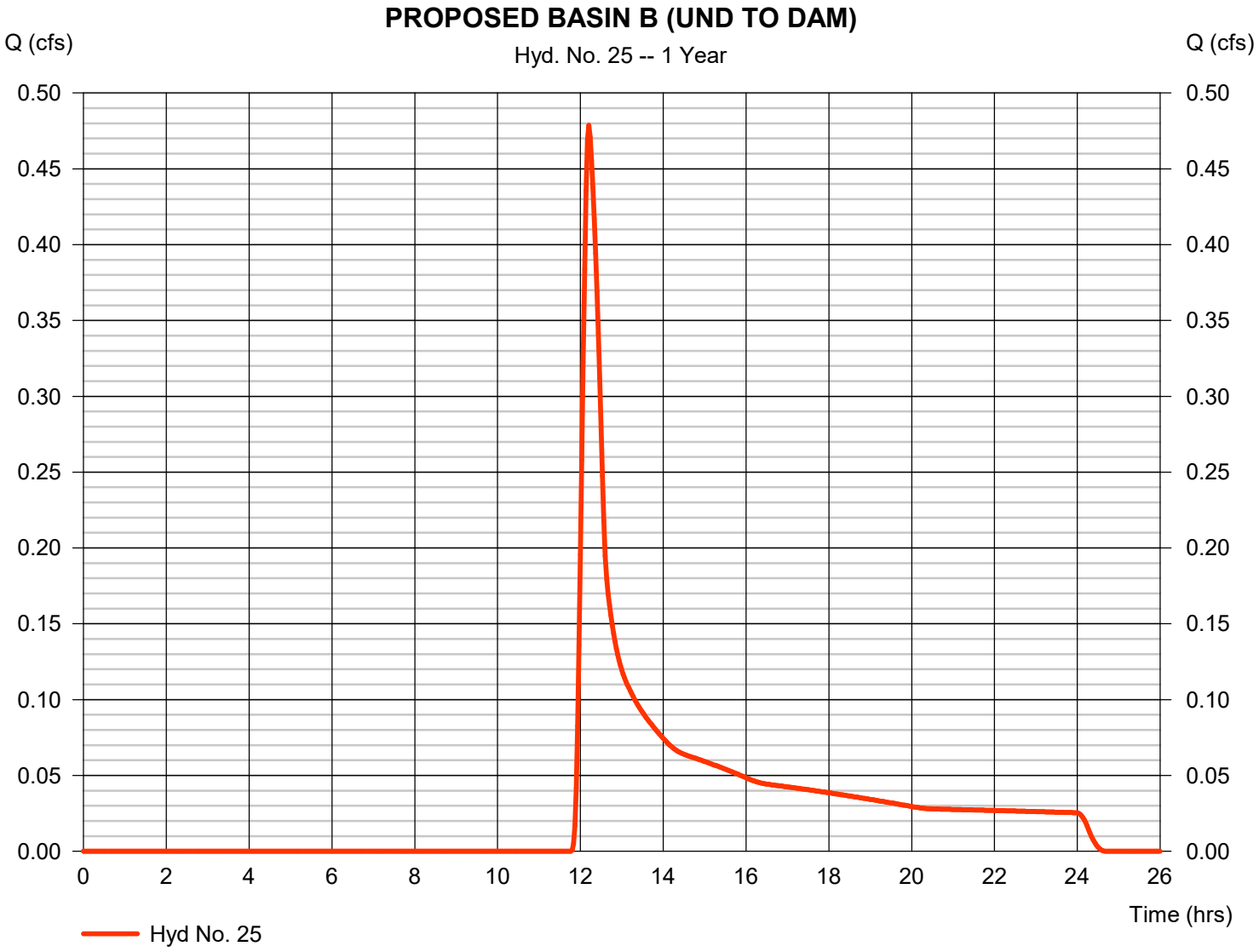


Hydrograph Report

Hyd. No. 25

PROPOSED BASIN B (UND TO DAM)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.479 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 2,768 cuft
Drainage area	= 2.130 ac	Curve number	= 65
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 25.00 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



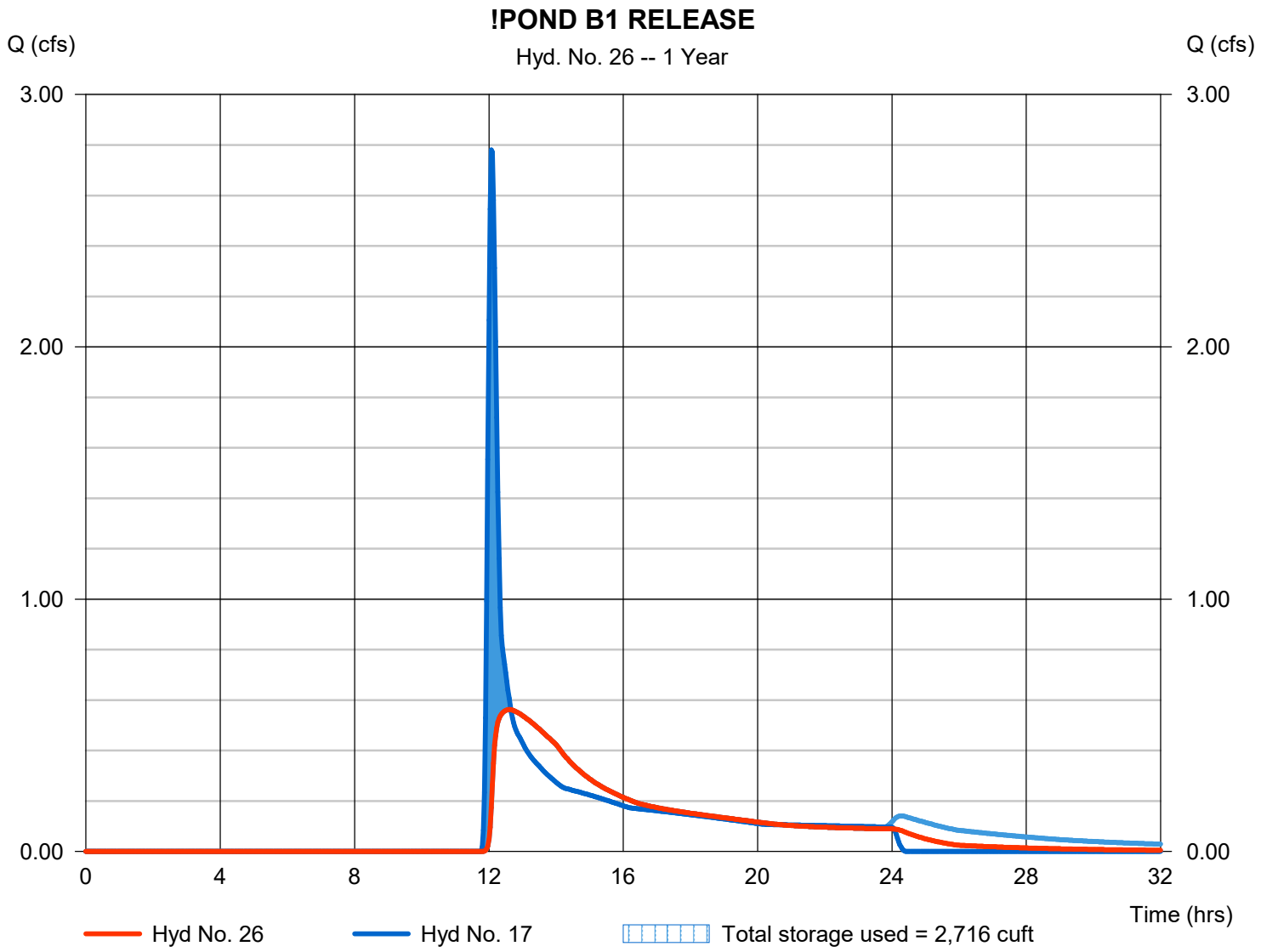
Hydrograph Report

Hyd. No. 26

!POND B1 RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	0.562 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.60 hrs
Time interval	=	2 min	Hyd. volume	=	9,984 cuft
Inflow hyd. No.	=	17 - PROPOSED BASIN B1	Max. Elevation	=	934.70 ft
Reservoir name	=	POND B1	Max. Storage	=	2,716 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 3 - POND B1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 934.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	934.00	3,050	0	0
1.00	935.00	4,780	3,882	3,882
2.00	936.00	6,610	5,670	9,552
3.00	937.00	8,560	7,563	17,115
4.00	938.00	10,625	9,573	26,688
5.00	939.00	12,800	11,694	38,383
6.00	940.00	15,120	13,943	52,325
7.00	941.00	17,200	16,147	68,473

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	6.00	0.00	0.00
Span (in)	= 15.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 934.00	934.00	0.00	0.00
Length (ft)	= 100.00	20.00	0.00	0.00
Slope (%)	= 1.00	1.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.28	25.00	0.00	0.00
Crest El. (ft)	= 938.00	939.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Ciplti	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.520 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	934.00	0.00	0.00	---	---	0.00	0.00	---	---	0.000	---	0.000
1.00	3,882	935.00	0.74 ic	0.73 ic	---	---	0.00	0.00	---	---	0.058	---	0.793
2.00	9,552	936.00	1.16 ic	1.15 ic	---	---	0.00	0.00	---	---	0.080	---	1.234
3.00	17,115	937.00	1.47 ic	1.47 ic	---	---	0.00	0.00	---	---	0.103	---	1.572
4.00	26,688	938.00	1.73 ic	1.73 ic	---	---	0.00	0.00	---	---	0.128	---	1.861
5.00	38,383	939.00	10.87 oc	0.32 ic	---	---	10.55 s	0.00	---	---	0.154	---	11.02
6.00	52,325	940.00	12.09 oc	0.14 ic	---	---	11.94 s	83.25	---	---	0.182	---	95.51
7.00	68,473	941.00	13.11 oc	0.08 ic	---	---	12.97 s	235.47	---	---	0.207	---	248.73

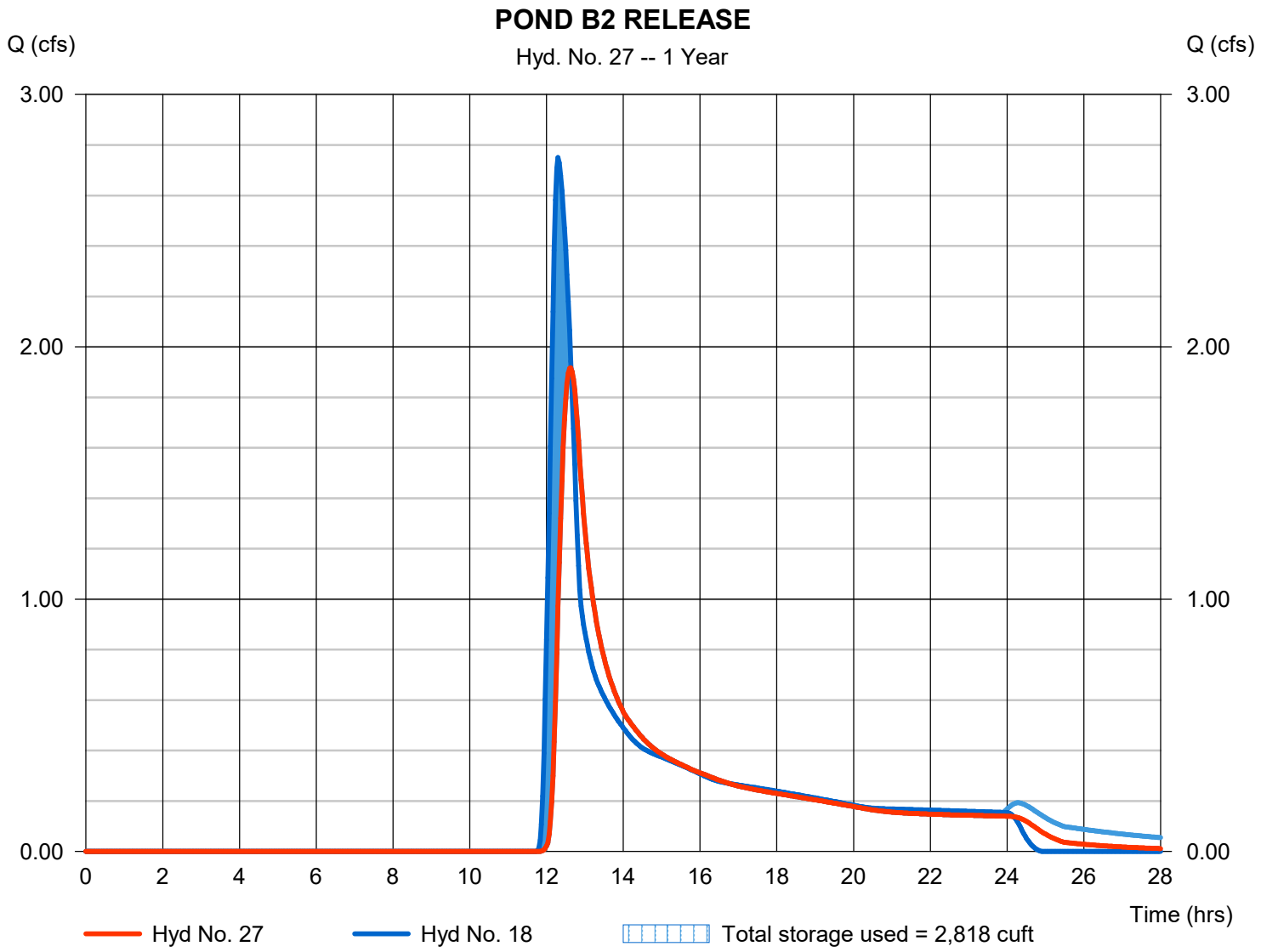
Hydrograph Report

Hyd. No. 27

POND B2 RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	1.917 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.63 hrs
Time interval	=	2 min	Hyd. volume	=	16,605 cuft
Inflow hyd. No.	=	18 - PROPOSED BASIN B2	Max. Elevation	=	938.80 ft
Reservoir name	=	POND B2	Max. Storage	=	2,818 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 4 - POND B2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 938.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	938.00	611	0	0
1.00	939.00	7,794	3,529	3,529
2.00	940.00	14,540	10,992	14,521
3.00	941.00	16,825	15,667	30,188
4.00	942.00	18,680	17,743	47,930
5.00	943.00	20,600	19,630	67,561

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	15.00	0.00	0.00
Span (in)	= 24.00	15.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 938.00	938.00	0.00	0.00
Length (ft)	= 100.00	10.00	0.00	0.00
Slope (%)	= 1.00	1.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.28	25.00	0.00	0.00
Crest El. (ft)	= 941.50	942.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.520 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

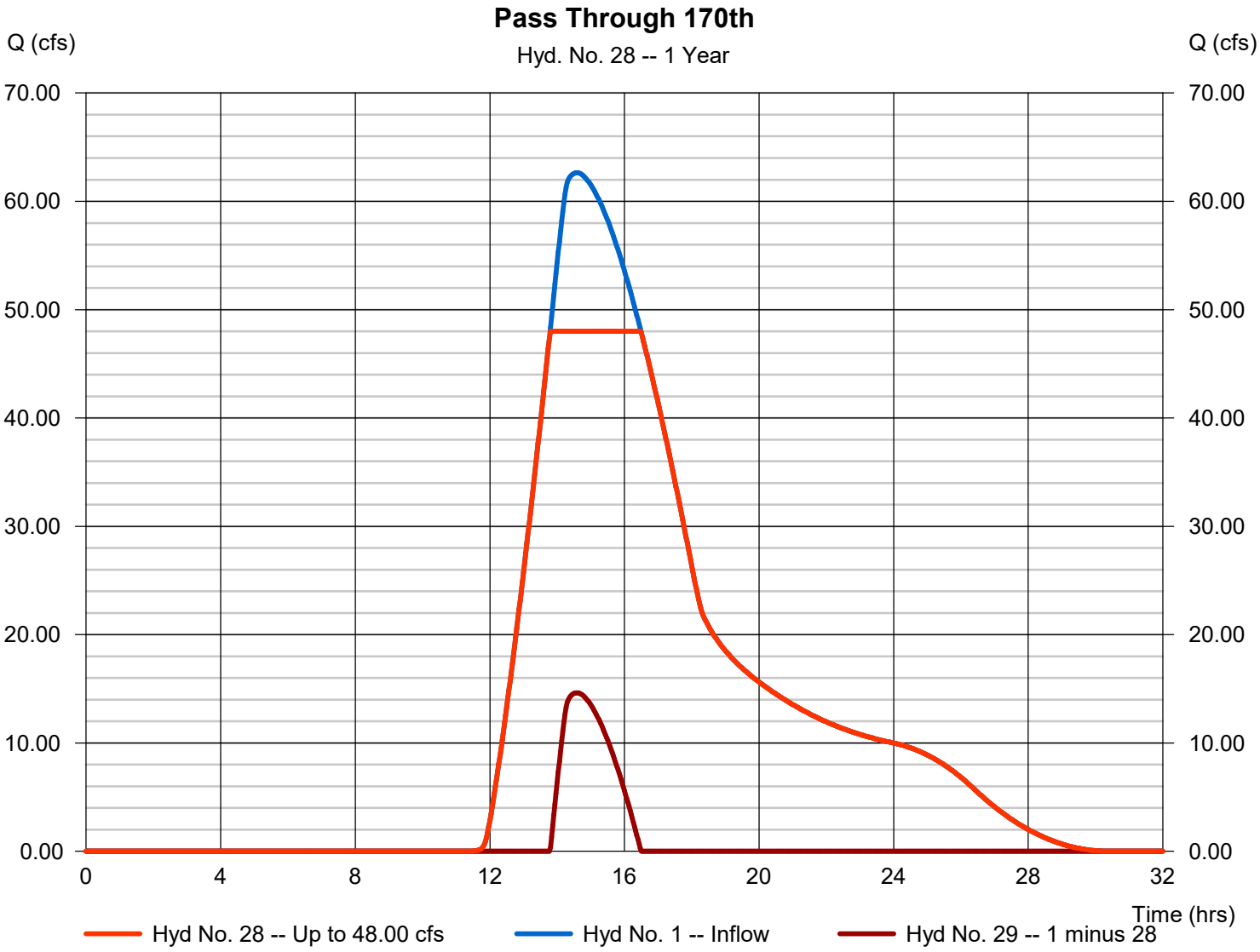
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	938.00	0.00	0.00	---	---	0.00	0.00	---	---	0.000	---	0.000
1.00	3,529	939.00	2.81 ic	2.81 ic	---	---	0.00	0.00	---	---	0.094	---	2.903
2.00	14,521	940.00	5.78 ic	5.78 ic	---	---	0.00	0.00	---	---	0.175	---	5.960
3.00	30,188	941.00	7.83 ic	7.83 ic	---	---	0.00	0.00	---	---	0.203	---	8.034
4.00	47,930	942.00	15.61 ic	8.22 ic	---	---	7.39	0.00	---	---	0.225	---	15.84
5.00	67,561	943.00	23.62 ic	7.38 ic	---	---	16.23 ic	65.00	---	---	0.248	---	88.86

Hydrograph Report

Hyd. No. 28

Pass Through 170th

Hydrograph type	= Diversion1	Peak discharge	= 48.00 cfs
Storm frequency	= 1 yrs	Time to peak	= 13.80 hrs
Time interval	= 2 min	Hyd. volume	= 1,238,636 cuft
Inflow hydrograph	= 1 - Off-Site Basin B (upper)	2nd diverted hyd.	= 29
Diversion method	= Constant Q	Constant Q	= 48.00 cfs

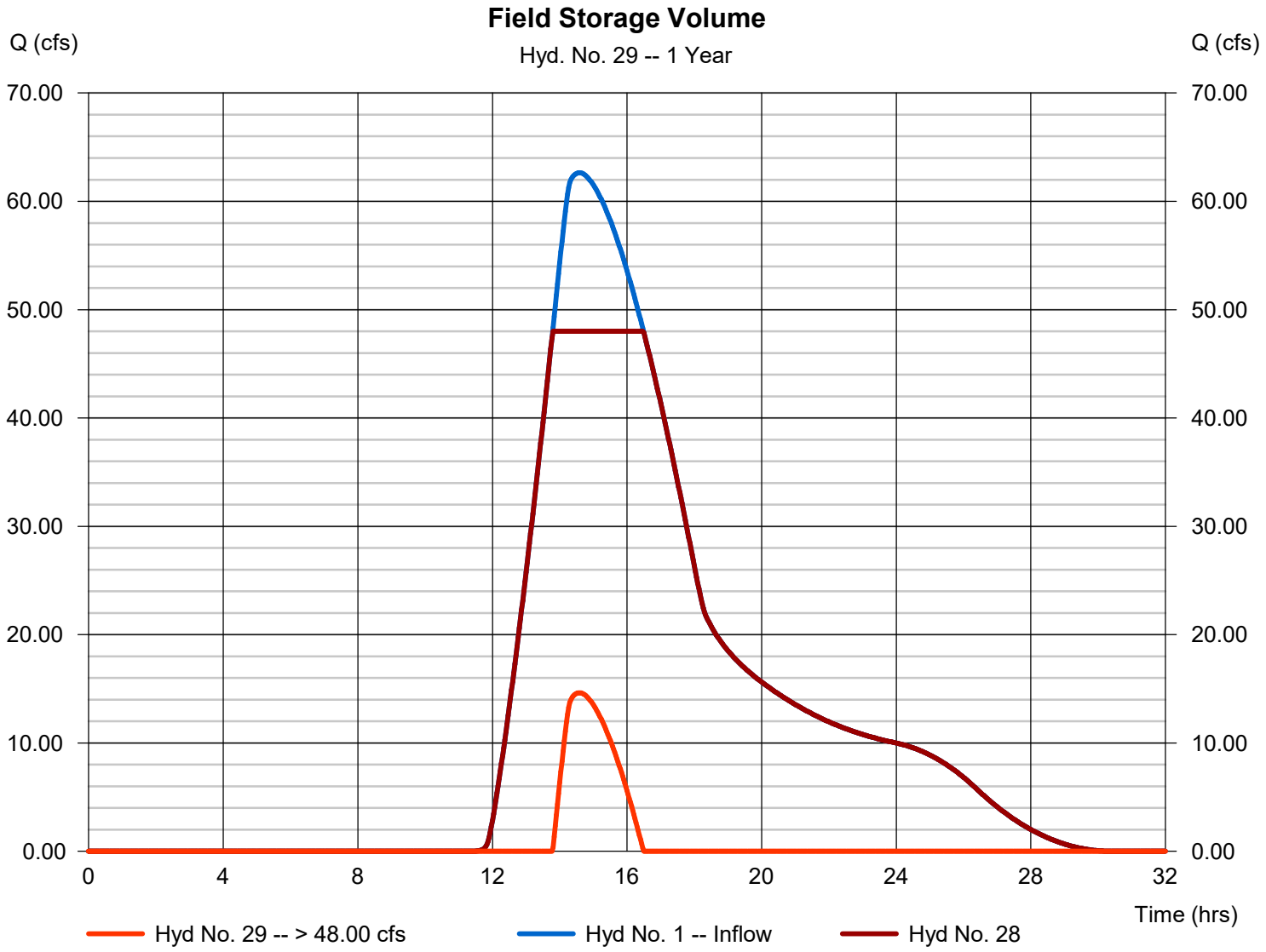


Hydrograph Report

Hyd. No. 29

Field Storage Volume

Hydrograph type	= Diversion2	Peak discharge	= 14.63 cfs
Storm frequency	= 1 yrs	Time to peak	= 14.60 hrs
Time interval	= 2 min	Hyd. volume	= 90,834 cuft
Inflow hydrograph	= 1 - Off-Site Basin B (upper)	2nd diverted hyd.	= 28
Diversion method	= Constant Q	Constant Q	= 48.00 cfs



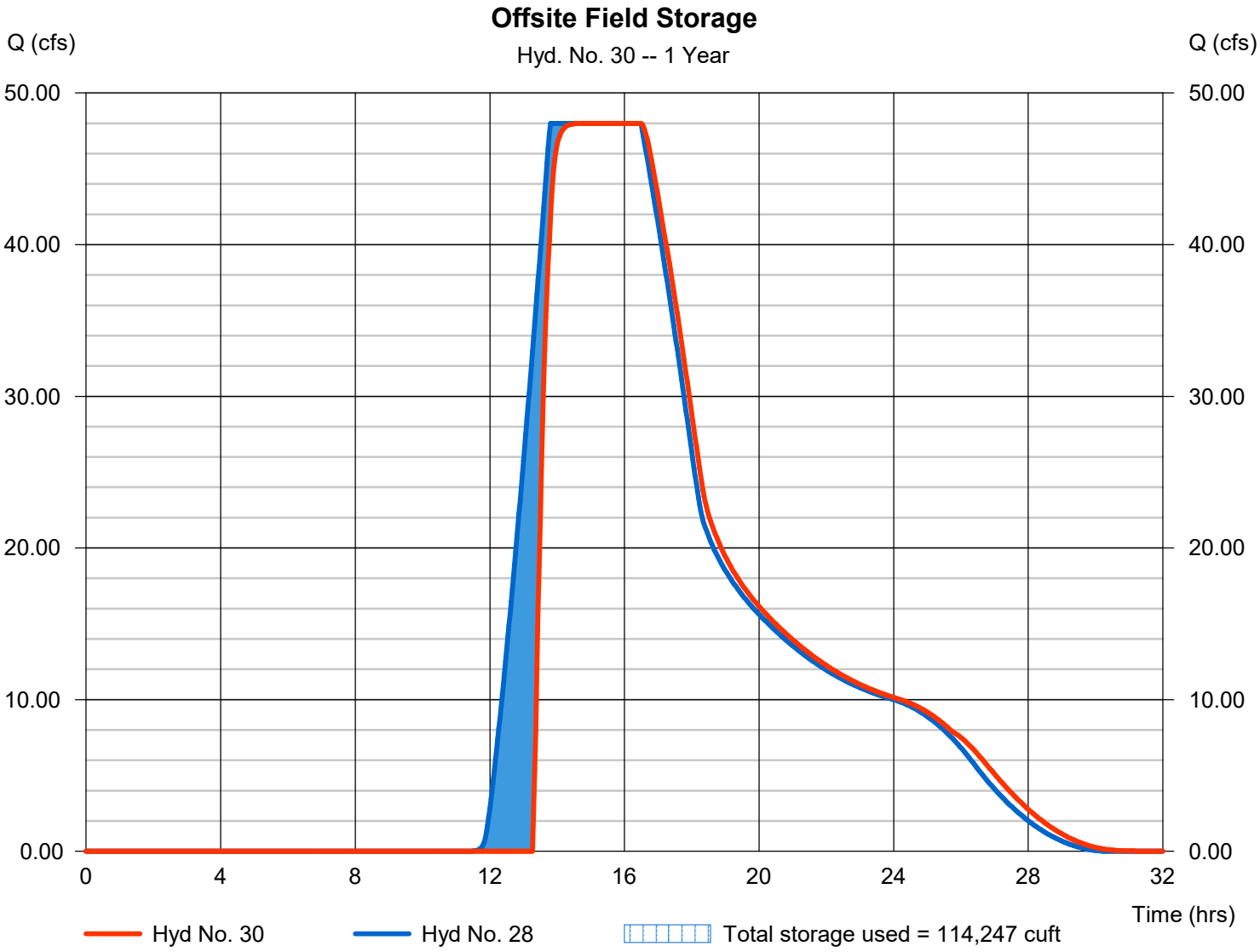
Hydrograph Report

Hyd. No. 30

Offsite Field Storage

Hydrograph type	=	Reservoir	Peak discharge	=	48.00 cfs
Storm frequency	=	1 yrs	Time to peak	=	15.43 hrs
Time interval	=	2 min	Hyd. volume	=	1,160,110 cuft
Inflow hyd. No.	=	28 - Pass Through 170th	Max. Elevation	=	957.83 ft
Reservoir name	=	Offsite Field Storage UPPER	Max. Storage	=	114,247 cuft

Storage Indication method used.



Pond Report

Pond No. 9 - Offsite Field Storage UPPER

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 956.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	956.00	500	0	0
1.00	957.00	67,693	24,668	24,668
2.00	958.00	153,535	107,714	132,382
3.00	959.00	299,214	222,339	354,722

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 75.00	0.00	0.00	0.00
Crest El. (ft)	= 957.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Ciplti	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

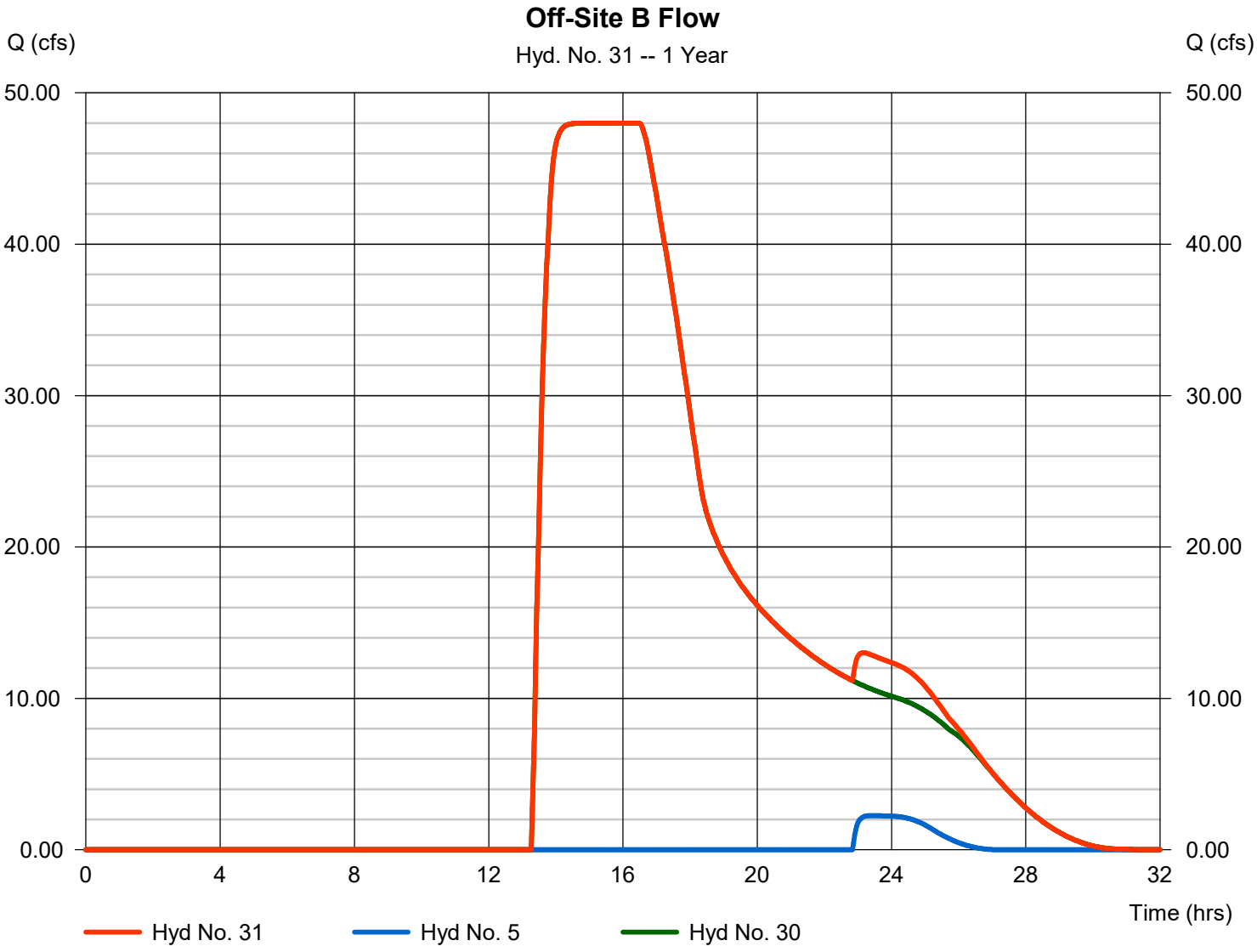
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	956.00	---	---	---	---	0.00	---	---	---	---	---	0.000
1.00	24,668	957.00	---	---	---	---	0.00	---	---	---	---	---	0.000
2.00	132,382	958.00	---	---	---	---	88.30	---	---	---	---	---	88.30
3.00	354,722	959.00	---	---	---	---	458.82	---	---	---	---	---	458.82

Hydrograph Report

Hyd. No. 31

Off-Site B Flow

Hydrograph type	= Combine	Peak discharge	= 48.00 cfs
Storm frequency	= 1 yrs	Time to peak	= 15.43 hrs
Time interval	= 2 min	Hyd. volume	= 1,180,206 cuft
Inflow hyds.	= 5, 30	Contrib. drain. area	= 0.000 ac



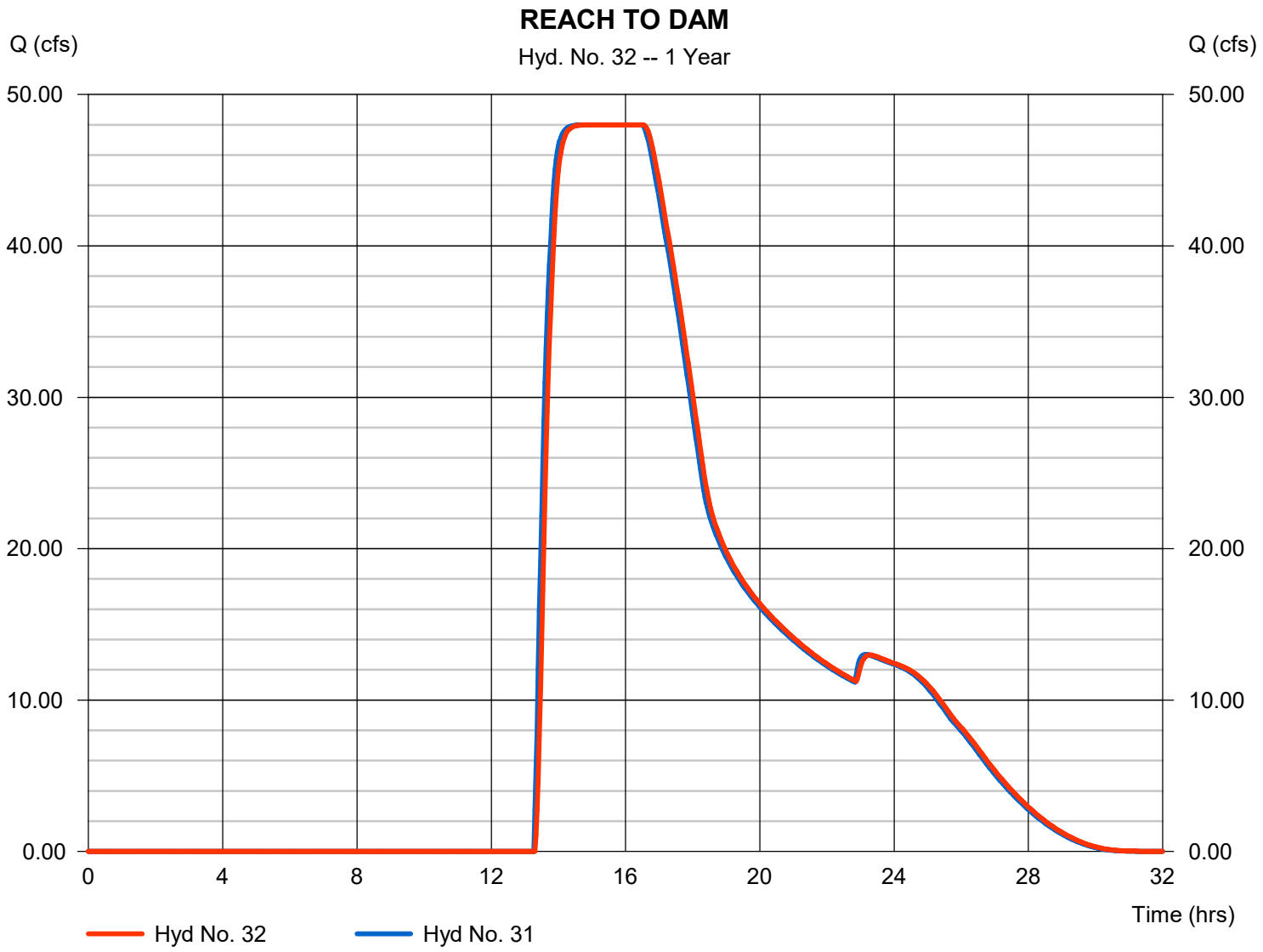
Hydrograph Report

Hyd. No. 32

REACH TO DAM

Hydrograph type	=	Reach	Peak discharge	=	48.00 cfs
Storm frequency	=	1 yrs	Time to peak	=	15.60 hrs
Time interval	=	2 min	Hyd. volume	=	1,180,194 cuft
Inflow hyd. No.	=	31 - Off-Site B Flow	Section type	=	Trapezoidal
Reach length	=	1000.0 ft	Channel slope	=	1.0 %
Manning's n	=	0.025	Bottom width	=	20.0 ft
Side slope	=	4.0:1	Max. depth	=	5.0 ft
Rating curve x	=	0.808	Rating curve m	=	1.438
Ave. velocity	=	2.80 ft/s	Routing coeff.	=	0.3893

Modified Att-Kin routing method used.



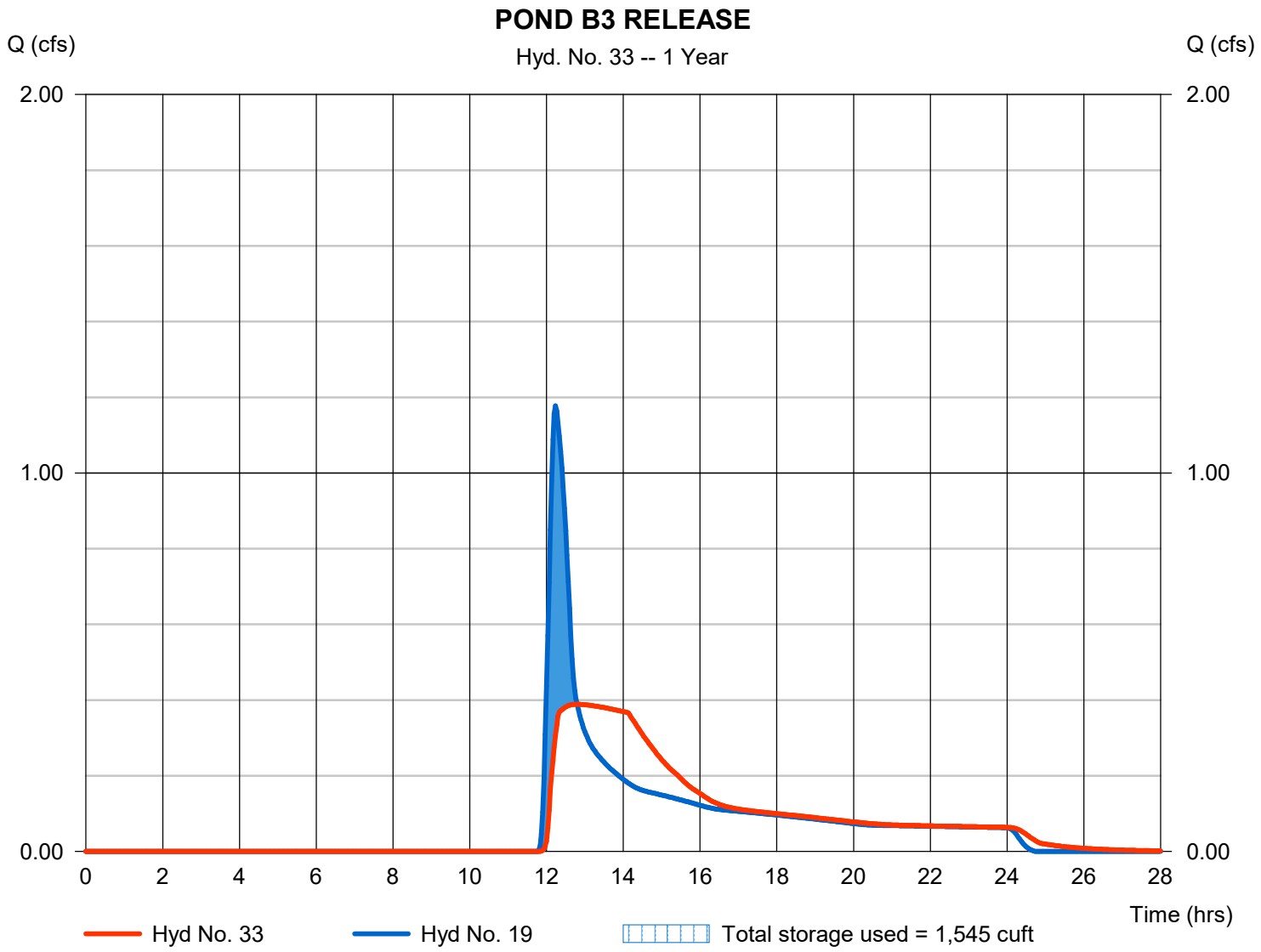
Hydrograph Report

Hyd. No. 33

POND B3 RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	0.389 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.80 hrs
Time interval	=	2 min	Hyd. volume	=	7,078 cuft
Inflow hyd. No.	=	19 - PROPOSED BASIN B3	Max. Elevation	=	938.11 ft
Reservoir name	=	POND B3	Max. Storage	=	1,545 cuft

Storage Indication method used.



Pond Report

Pond No. 5 - POND B3

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 937.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	937.00	00	0	0
1.00	938.00	2,790	930	930
2.00	939.00	9,400	5,770	6,700
3.00	940.00	11,700	10,528	17,228
4.00	941.00	13,500	12,588	29,816
5.00	942.00	15,370	14,423	44,239
6.00	943.00	17,330	16,339	60,578
7.00	944.00	18,250	17,786	78,364

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	4.00	0.00	0.00
Span (in)	= 24.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 937.00	937.00	0.00	0.00
Length (ft)	= 100.00	25.00	0.00	0.00
Slope (%)	= 1.00	1.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.28	25.00	0.00	0.00
Crest El. (ft)	= 942.00	943.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Ciplti	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

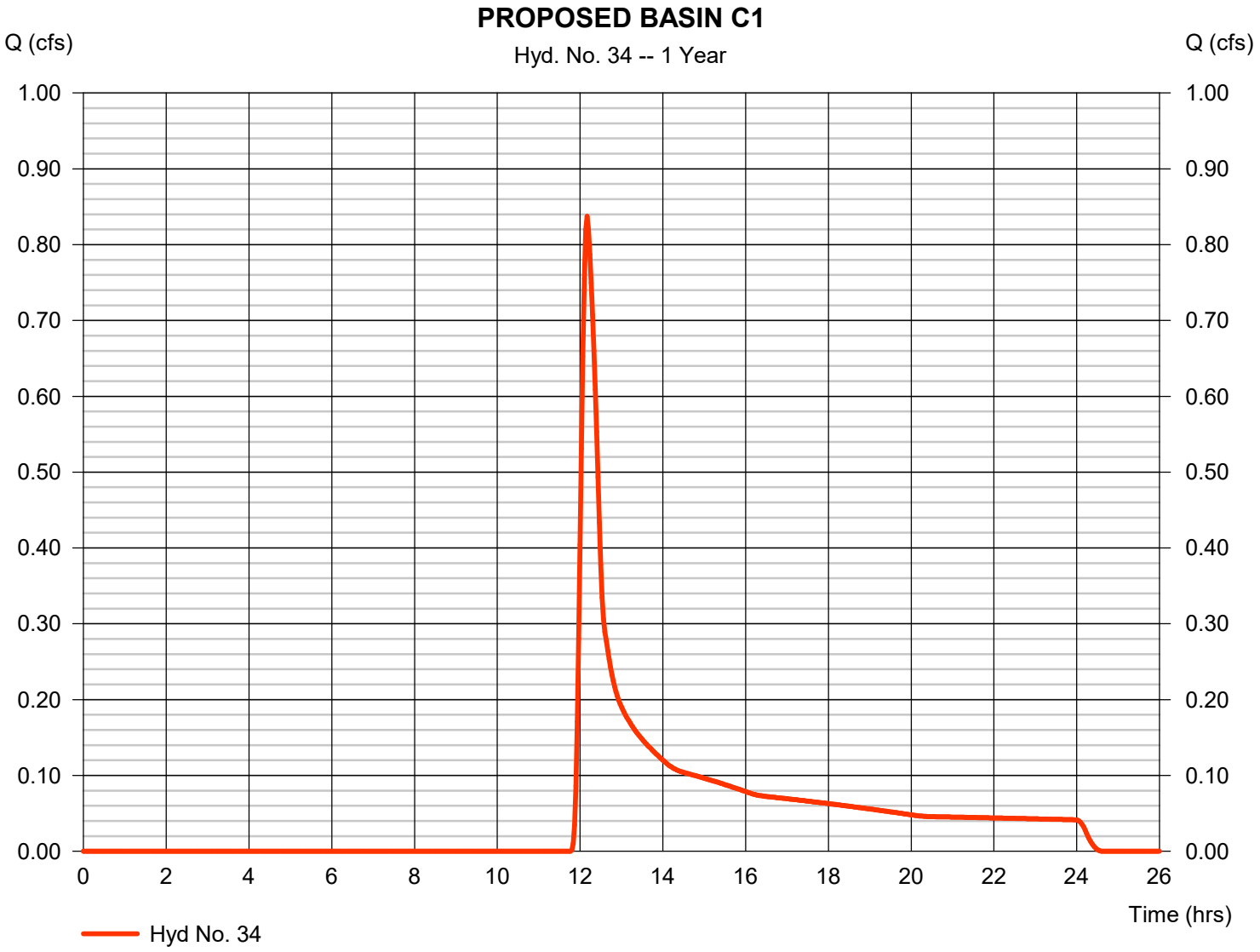
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	937.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.00	930	938.00	0.38 ic	0.37 ic	---	---	0.00	0.00	---	---	---	---	0.366
2.00	6,700	939.00	0.56 ic	0.55 ic	---	---	0.00	0.00	---	---	---	---	0.549
3.00	17,228	940.00	0.69 ic	0.69 ic	---	---	0.00	0.00	---	---	---	---	0.687
4.00	29,816	941.00	0.84 ic	0.80 ic	---	---	0.00	0.00	---	---	---	---	0.801
5.00	44,239	942.00	0.90 ic	0.90 ic	---	---	0.00	0.00	---	---	---	---	0.902
6.00	60,578	943.00	15.60 ic	0.83 ic	---	---	13.25 ic	0.00	---	---	---	---	14.09
7.00	78,364	944.00	19.62 ic	0.87 ic	---	---	18.74 ic	83.25	---	---	---	---	102.87

Hydrograph Report

Hyd. No. 34

PROPOSED BASIN C1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.838 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 4,529 cuft
Drainage area	= 3.370 ac	Curve number	= 65
Basin Slope	= 2.3 %	Hydraulic length	= 630 ft
Tc method	= LAG	Time of conc. (Tc)	= 22.00 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

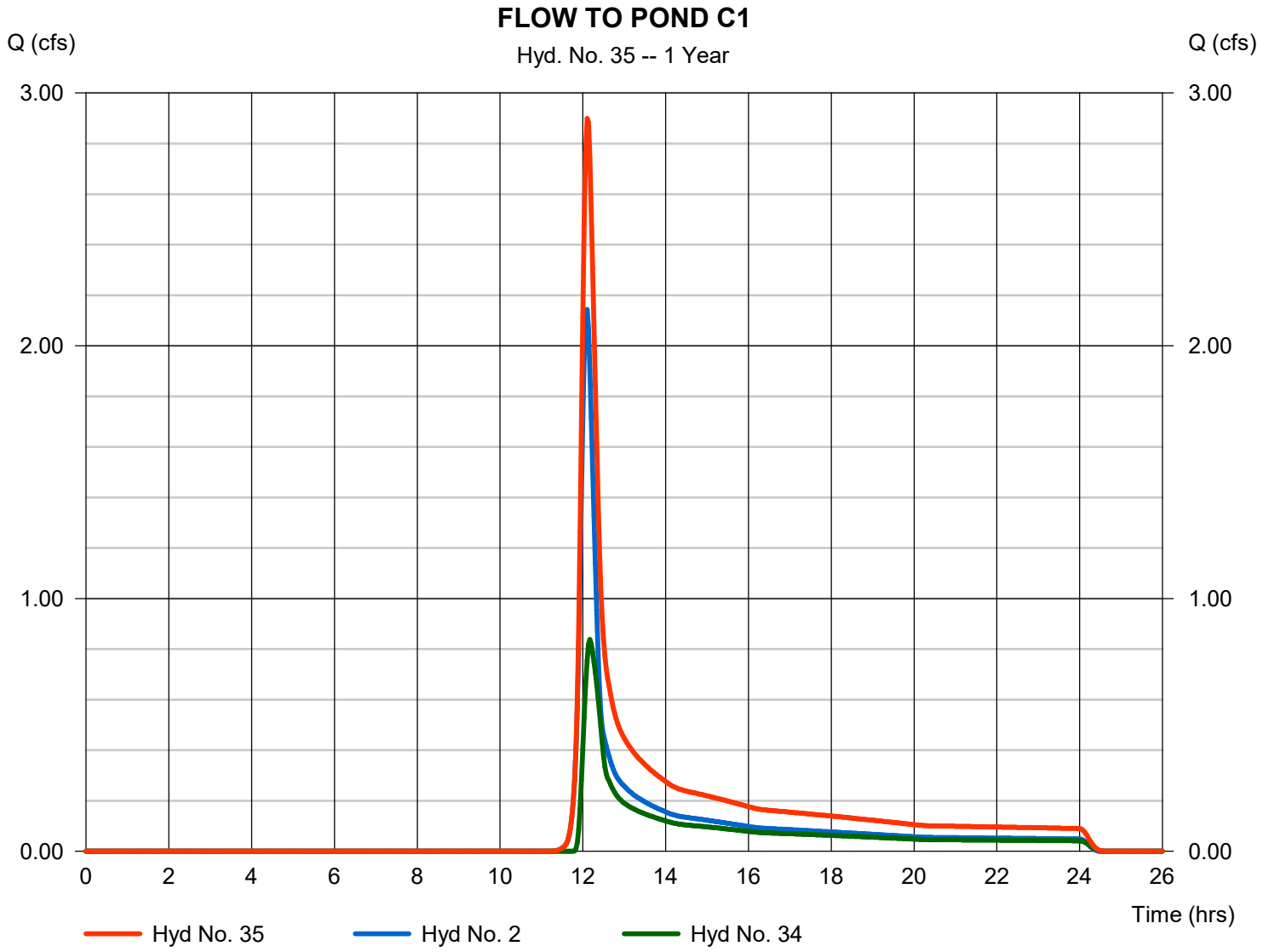


Hydrograph Report

Hyd. No. 35

FLOW TO POND C1

Hydrograph type	= Combine	Peak discharge	= 2.899 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 11,790 cuft
Inflow hyds.	= 2, 34	Contrib. drain. area	= 6.030 ac

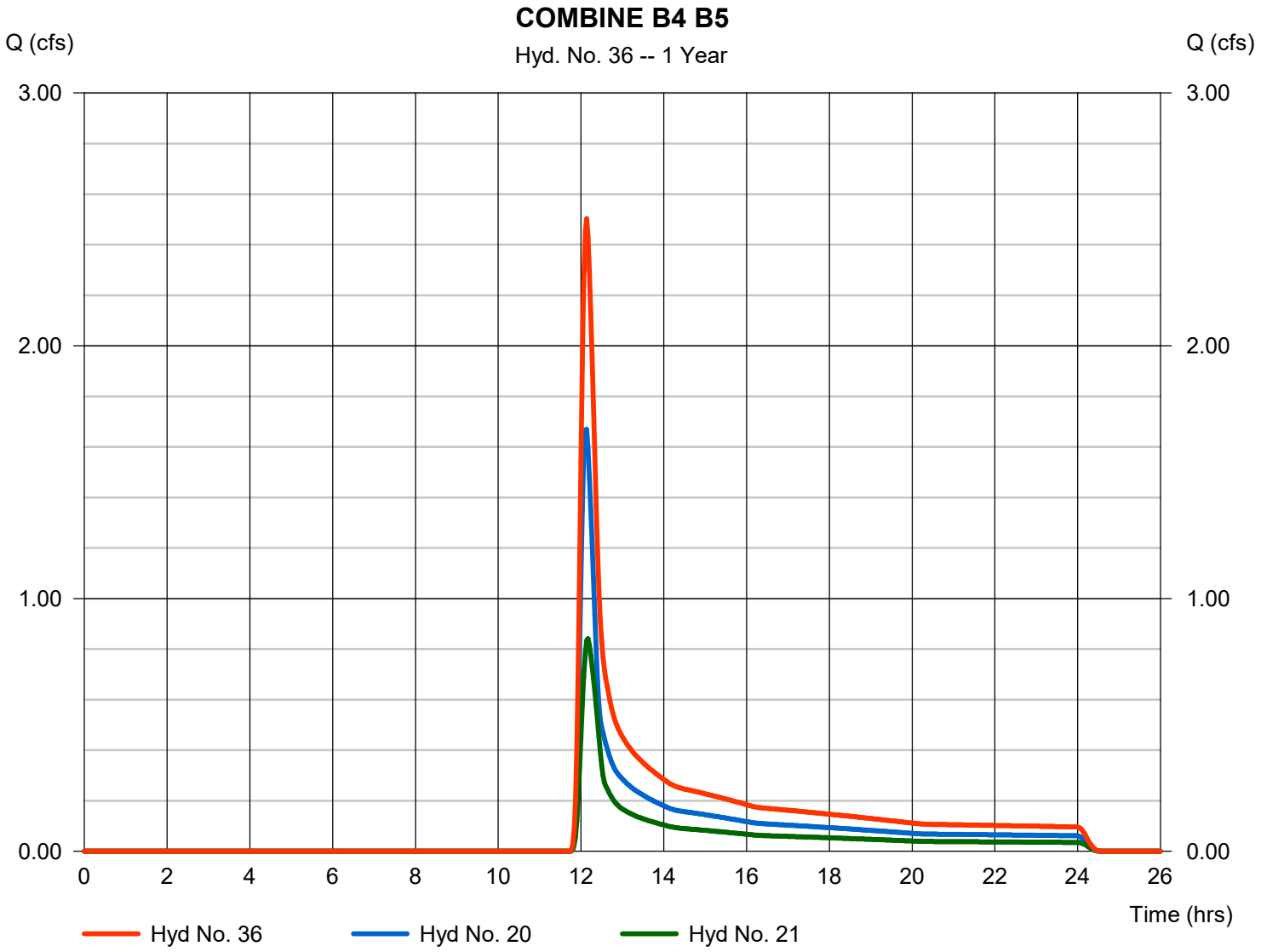


Hydrograph Report

Hyd. No. 36

COMBINE B4 B5

Hydrograph type	= Combine	Peak discharge	= 2.503 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 11,264 cuft
Inflow hyds.	= 20, 21	Contrib. drain. area	= 7.180 ac



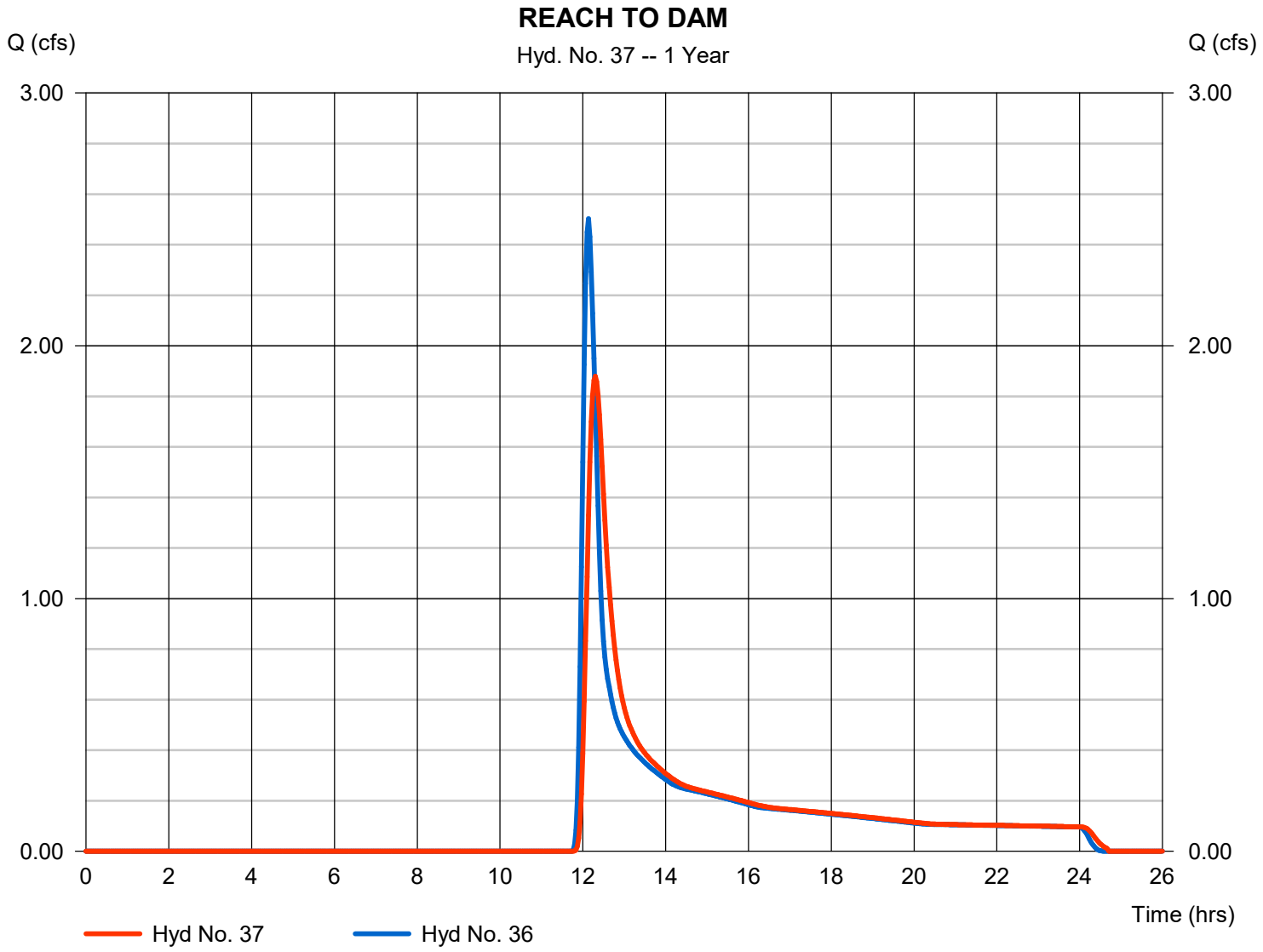
Hydrograph Report

Hyd. No. 37

REACH TO DAM

Hydrograph type	=	Reach	Peak discharge	=	1.879 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.30 hrs
Time interval	=	2 min	Hyd. volume	=	11,257 cuft
Inflow hyd. No.	=	36 - COMBINE B4 B5	Section type	=	Trapezoidal
Reach length	=	1000.0 ft	Channel slope	=	1.0 %
Manning's n	=	0.025	Bottom width	=	20.0 ft
Side slope	=	4.0:1	Max. depth	=	5.0 ft
Rating curve x	=	0.808	Rating curve m	=	1.438
Ave. velocity	=	1.14 ft/s	Routing coeff.	=	0.1791

Modified Att-Kin routing method used.

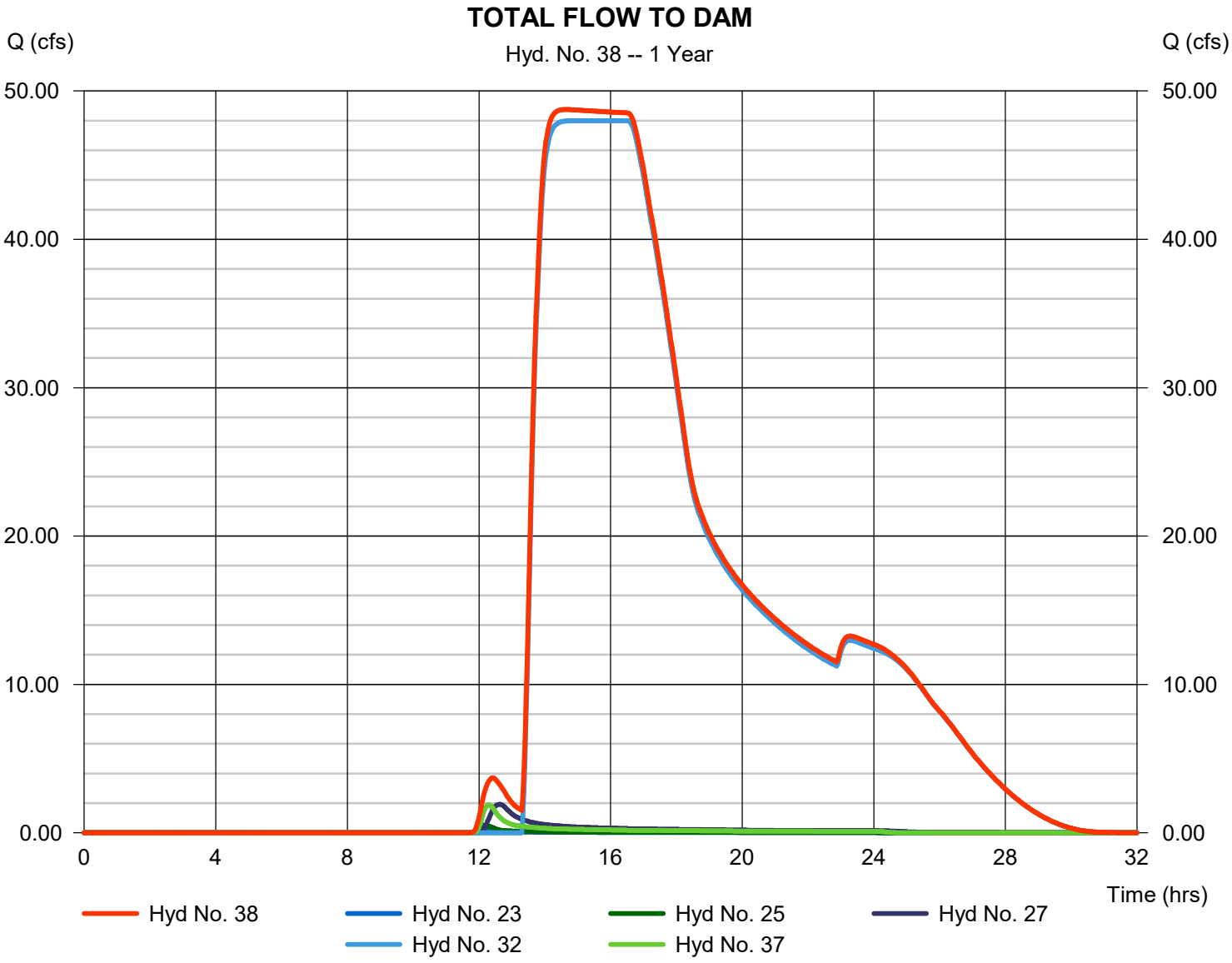


Hydrograph Report

Hyd. No. 38

TOTAL FLOW TO DAM

Hydrograph type	= Combine	Peak discharge	= 48.75 cfs
Storm frequency	= 1 yrs	Time to peak	= 14.63 hrs
Time interval	= 2 min	Hyd. volume	= 1,212,655 cuft
Inflow hyds.	= 23, 25, 27, 32, 37	Contrib. drain. area	= 3.090 ac



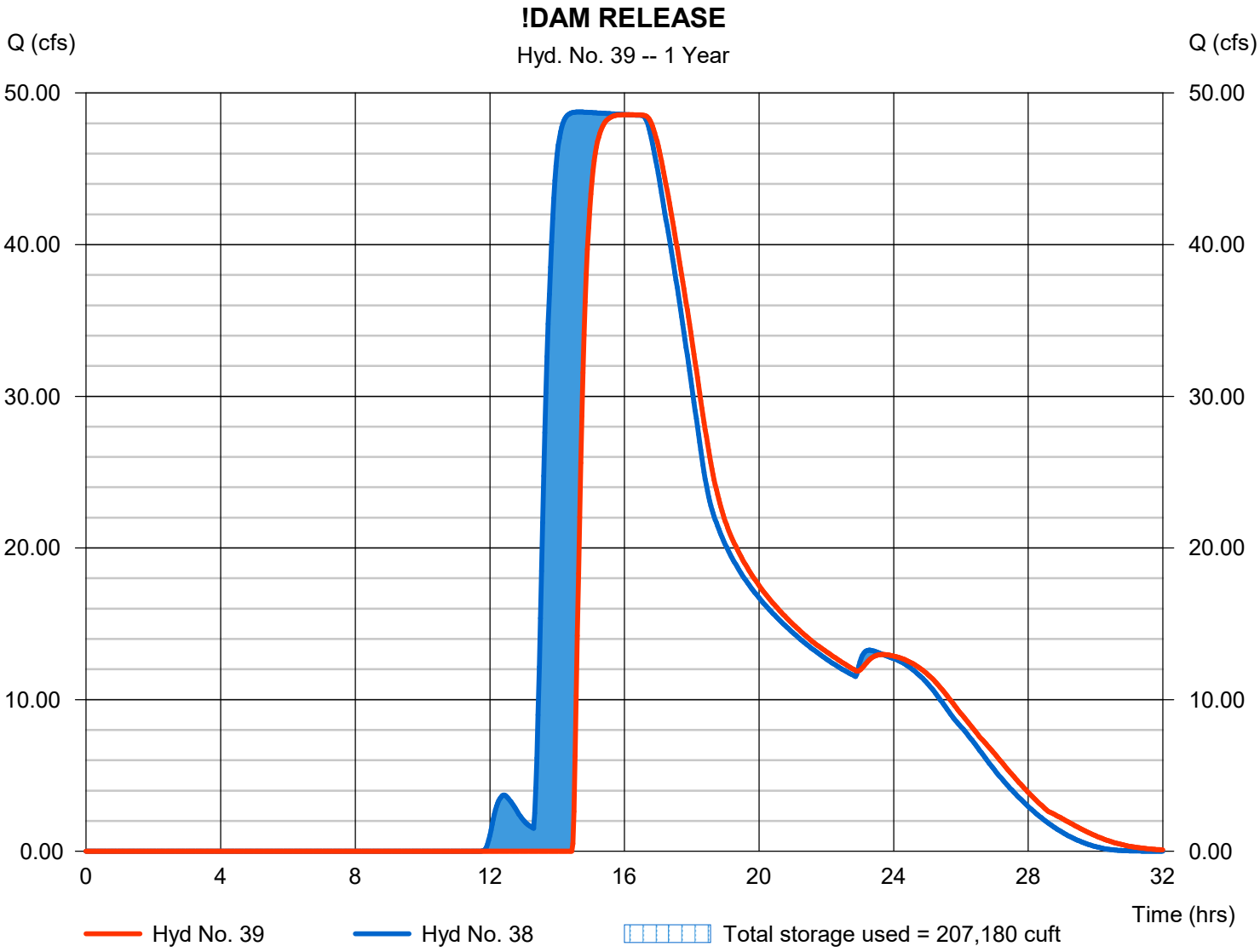
Hydrograph Report

Hyd. No. 39

!DAM RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	48.57 cfs
Storm frequency	=	1 yrs	Time to peak	=	16.03 hrs
Time interval	=	2 min	Hyd. volume	=	1,054,492 cuft
Inflow hyd. No.	=	38 - TOTAL FLOW TO DAM	Max. Elevation	=	942.70 ft
Reservoir name	=	EXISTING DAM	Max. Storage	=	207,180 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - EXISTING DAM

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 933.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	933.00	10	0	0
1.00	934.00	50	27	27
2.00	935.00	75	62	90
3.00	936.00	3,439	1,340	1,430
4.00	937.00	7,836	5,488	6,918
5.00	938.00	14,583	11,035	17,952
6.00	939.00	23,387	18,810	36,763
7.00	940.00	35,992	29,461	66,224
8.00	941.00	44,215	40,029	106,253
9.00	942.00	60,012	51,908	158,161
10.00	943.00	80,901	70,190	228,351
11.00	944.00	98,000	89,305	317,656
11.50	944.50	106,226	51,038	368,693
12.00	945.00	110,000	54,048	422,742

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	1.25
Span (in)	= 24.00	0.00	0.00	1.25
No. Barrels	= 1	0	0	72
Invert El. (ft)	= 976.80	0.00	0.00	933.00
Length (ft)	= 105.00	0.00	0.00	6.00
Slope (%)	= 0.45	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	Yes

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	25.00	0.00	0.00
Crest El. (ft)	= 933.00	942.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Ciplti	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

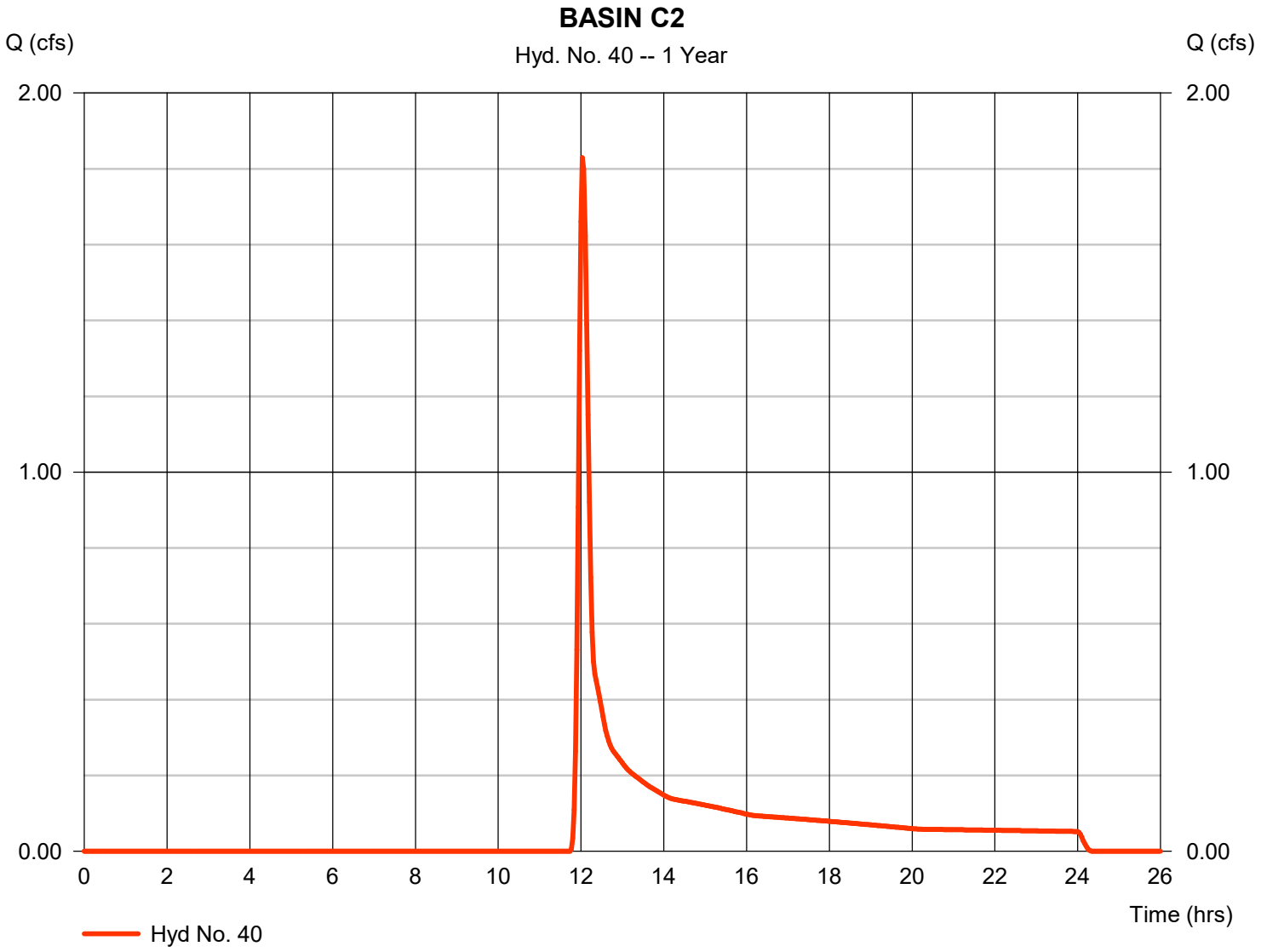
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	933.00	0.00	---	---	0.00	0.00	0.00	---	---	---	---	0.000
1.00	27	934.00	0.00	---	---	0.00	0.25 s	0.00	---	---	---	---	0.000
2.00	90	935.00	0.00	---	---	0.00	0.70 s	0.00	---	---	---	---	0.000
3.00	1,430	936.00	0.00	---	---	0.00	0.74 s	0.00	---	---	---	---	0.000
4.00	6,918	937.00	0.00	---	---	0.00	1.43 s	0.00	---	---	---	---	0.000
5.00	17,952	938.00	0.00	---	---	0.00	1.48 s	0.00	---	---	---	---	0.000
6.00	36,763	939.00	0.00	---	---	0.00	2.37 s	0.00	---	---	---	---	0.000
7.00	66,224	940.00	0.00	---	---	0.00	1.91 s	0.00	---	---	---	---	0.000
8.00	106,253	941.00	0.00	---	---	0.00	3.09 s	0.00	---	---	---	---	0.000
9.00	158,161	942.00	0.00	---	---	0.00	2.84 s	0.00	---	---	---	---	0.000
10.00	228,351	943.00	0.00	---	---	0.00	4.19 s	83.25	---	---	---	---	83.25
11.00	317,656	944.00	0.00	---	---	0.00	3.15 s	235.47	---	---	---	---	235.47
11.50	368,693	944.50	0.00	---	---	0.00	4.05 s	329.07	---	---	---	---	329.07
12.00	422,742	945.00	0.00	---	---	0.00	4.85 s	432.58	---	---	---	---	432.58

Hydrograph Report

Hyd. No. 40

BASIN C2

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.830 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	6,125 cuft
Drainage area	=	3.810 ac	Curve number	=	67
Basin Slope	=	3.5 %	Hydraulic length	=	457 ft
Tc method	=	LAG	Time of conc. (Tc)	=	13.10 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

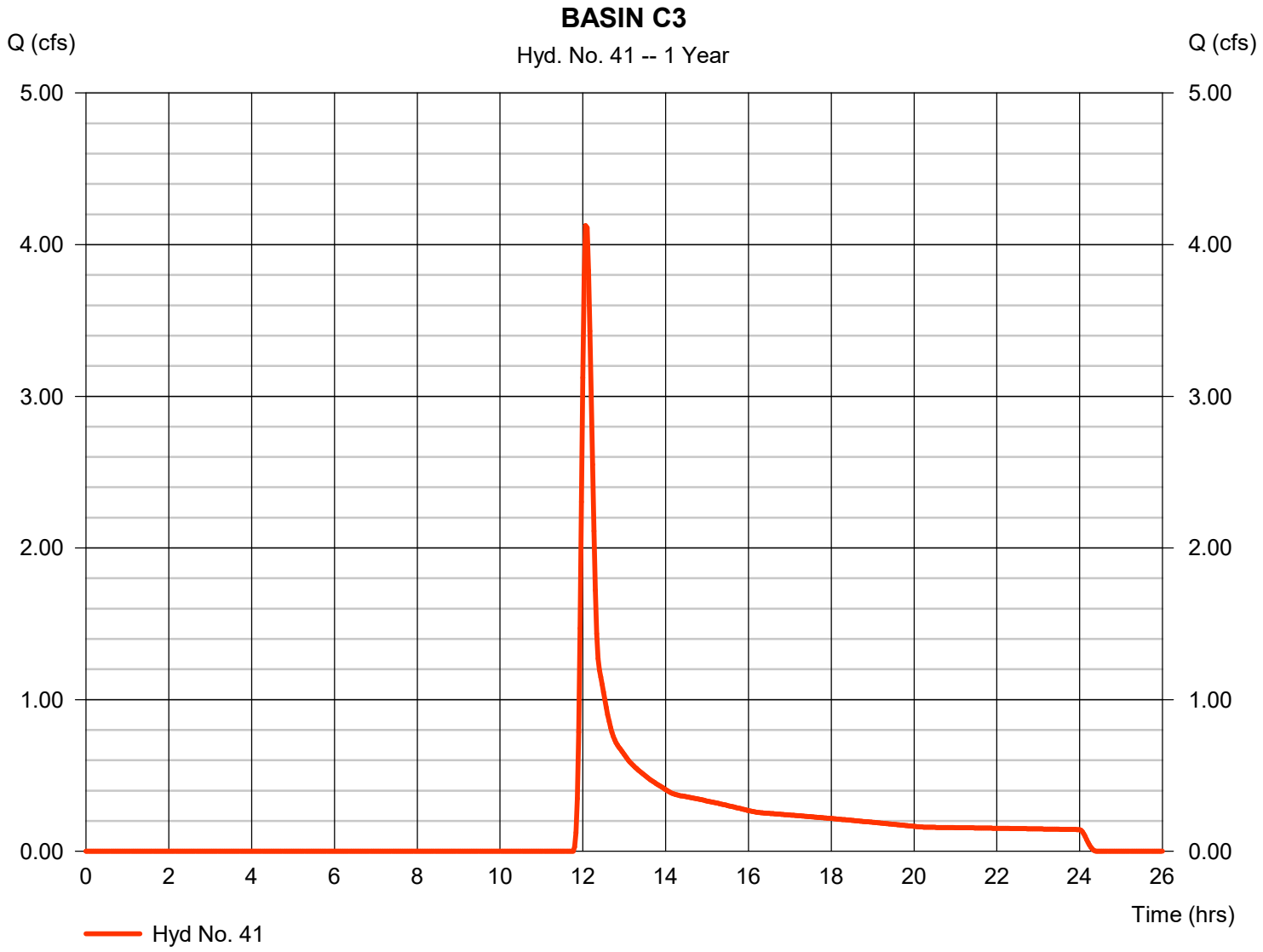


Hydrograph Report

Hyd. No. 41

BASIN C3

Hydrograph type	= SCS Runoff	Peak discharge	= 4.125 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 16,205 cuft
Drainage area	= 11.570 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

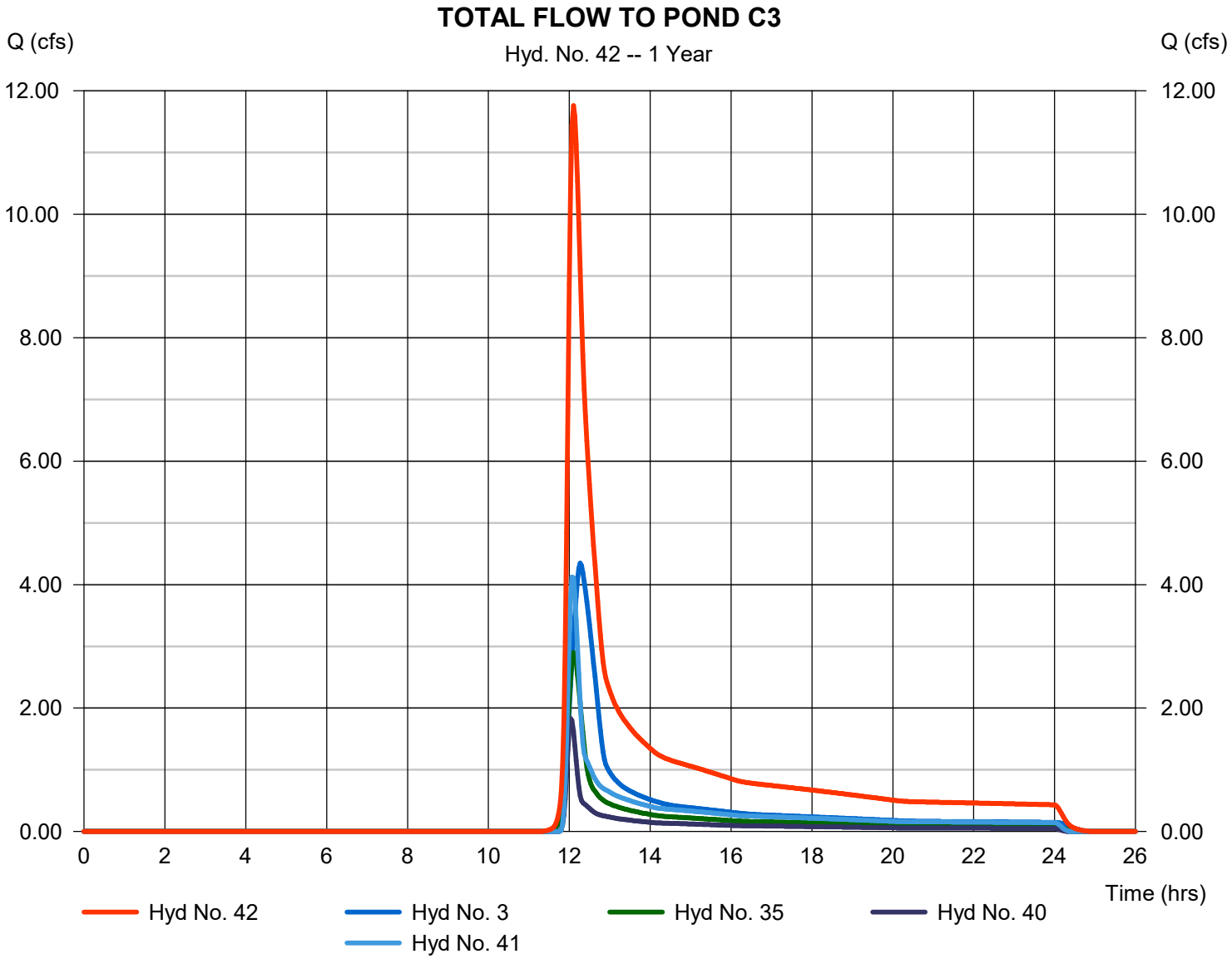


Hydrograph Report

Hyd. No. 42

TOTAL FLOW TO POND C3

Hydrograph type	= Combine	Peak discharge	= 11.76 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 56,089 cuft
Inflow hyds.	= 3, 35, 40, 41	Contrib. drain. area	= 23.520 ac



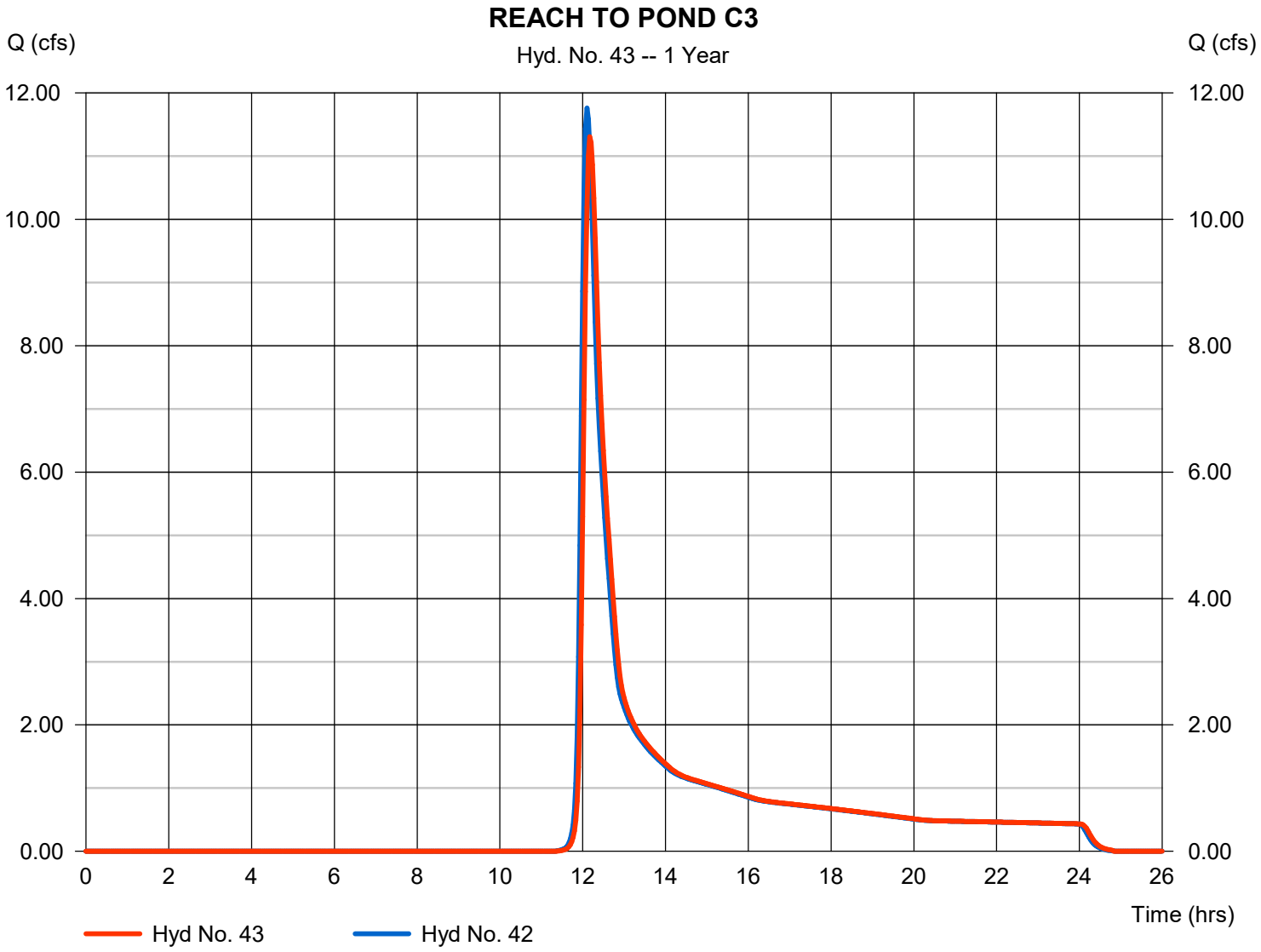
Hydrograph Report

Hyd. No. 43

REACH TO POND C3

Hydrograph type	= Reach	Peak discharge	= 11.31 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 56,086 cuft
Inflow hyd. No.	= 42 - TOTAL FLOW TO POND C3	Section type	= Trapezoidal
Reach length	= 450.0 ft	Channel slope	= 1.0 %
Manning's n	= 0.025	Bottom width	= 20.0 ft
Side slope	= 4.0:1	Max. depth	= 5.0 ft
Rating curve x	= 0.808	Rating curve m	= 1.438
Ave. velocity	= 1.83 ft/s	Routing coeff.	= 0.5185

Modified Att-Kin routing method used.

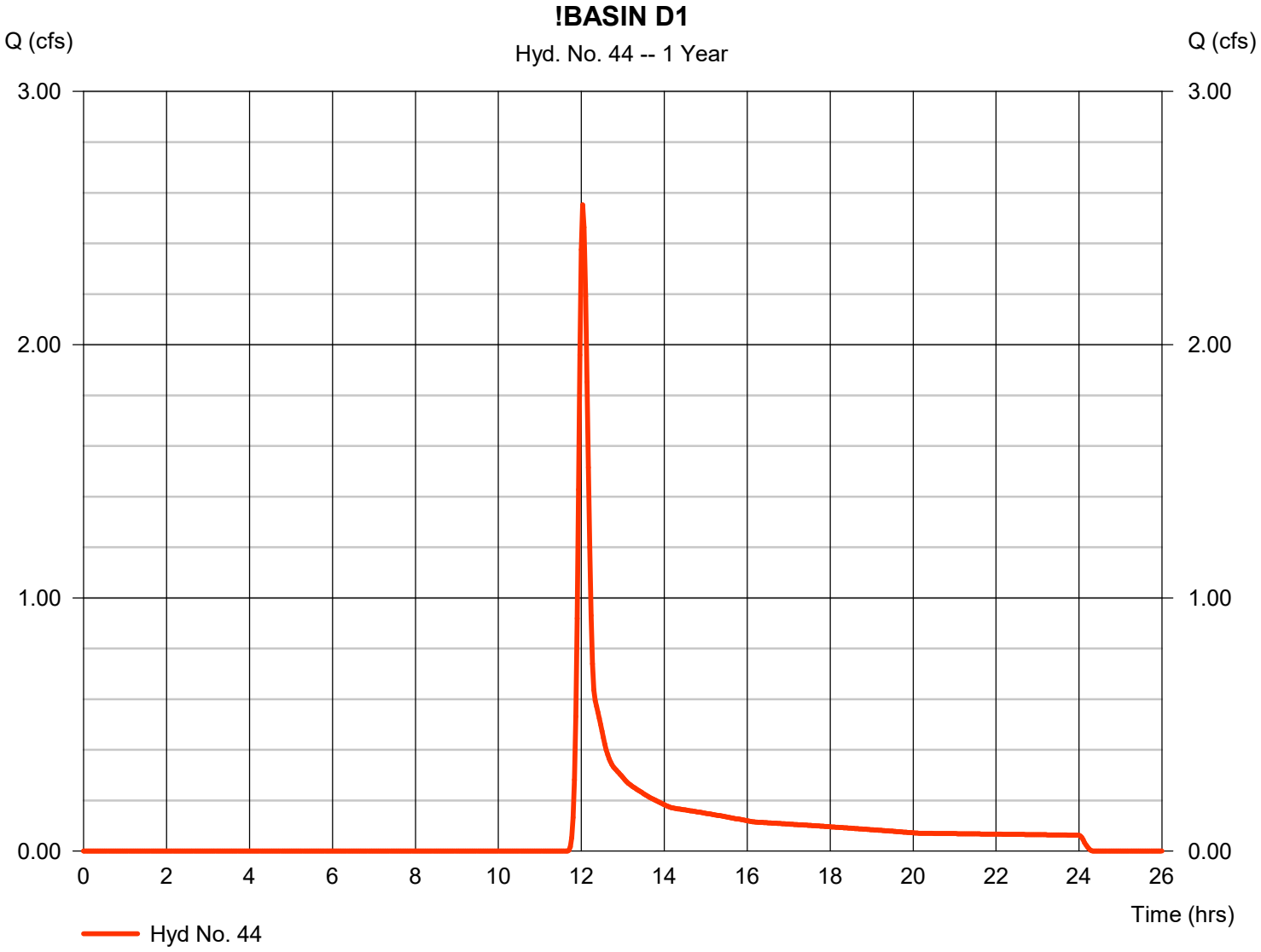


Hydrograph Report

Hyd. No. 44

!BASIN D1

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.552 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	7,876 cuft
Drainage area	=	4.200 ac	Curve number	=	69
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

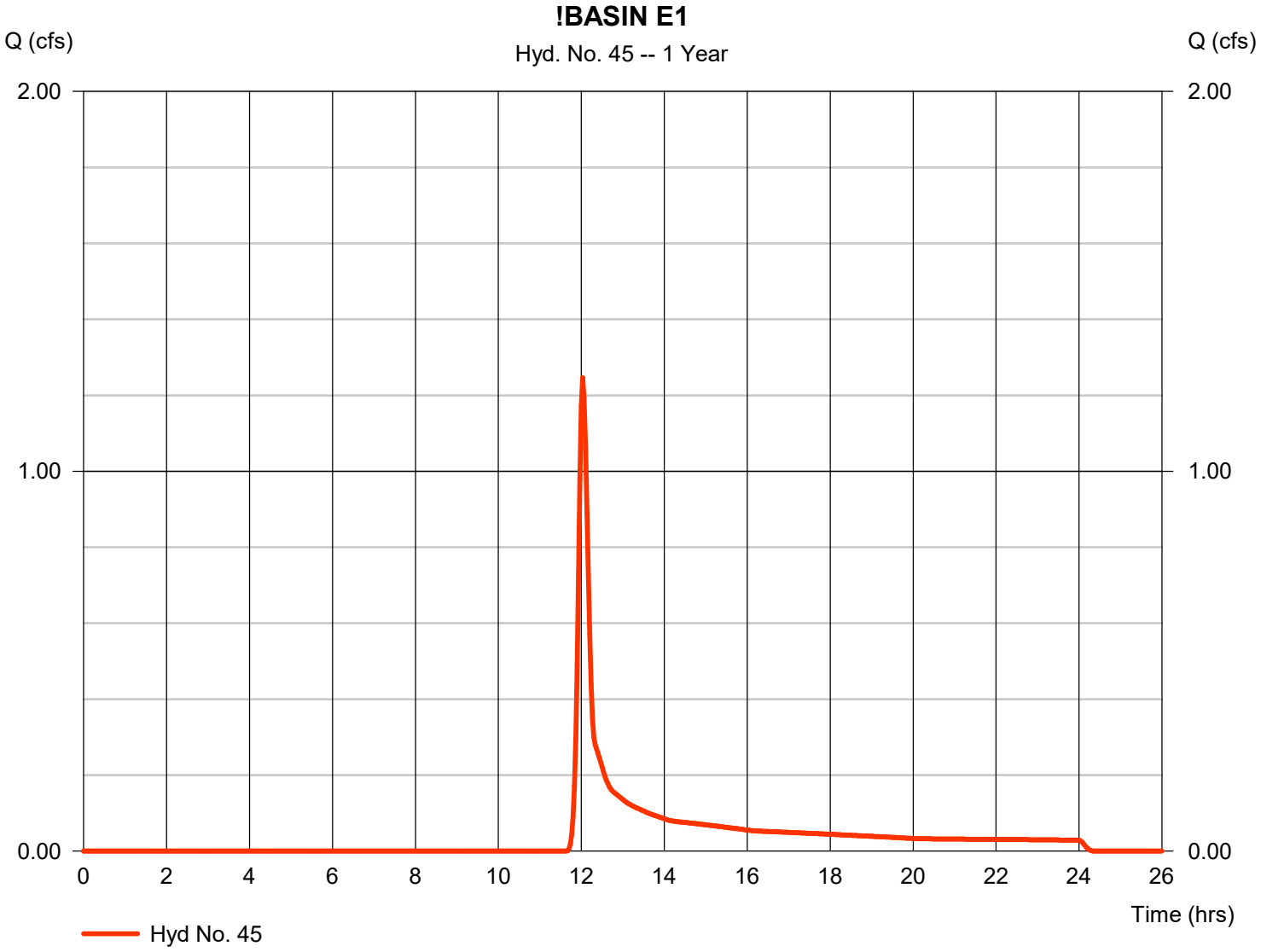


Hydrograph Report

Hyd. No. 45

!BASIN E1

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.247 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	3,732 cuft
Drainage area	=	1.850 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



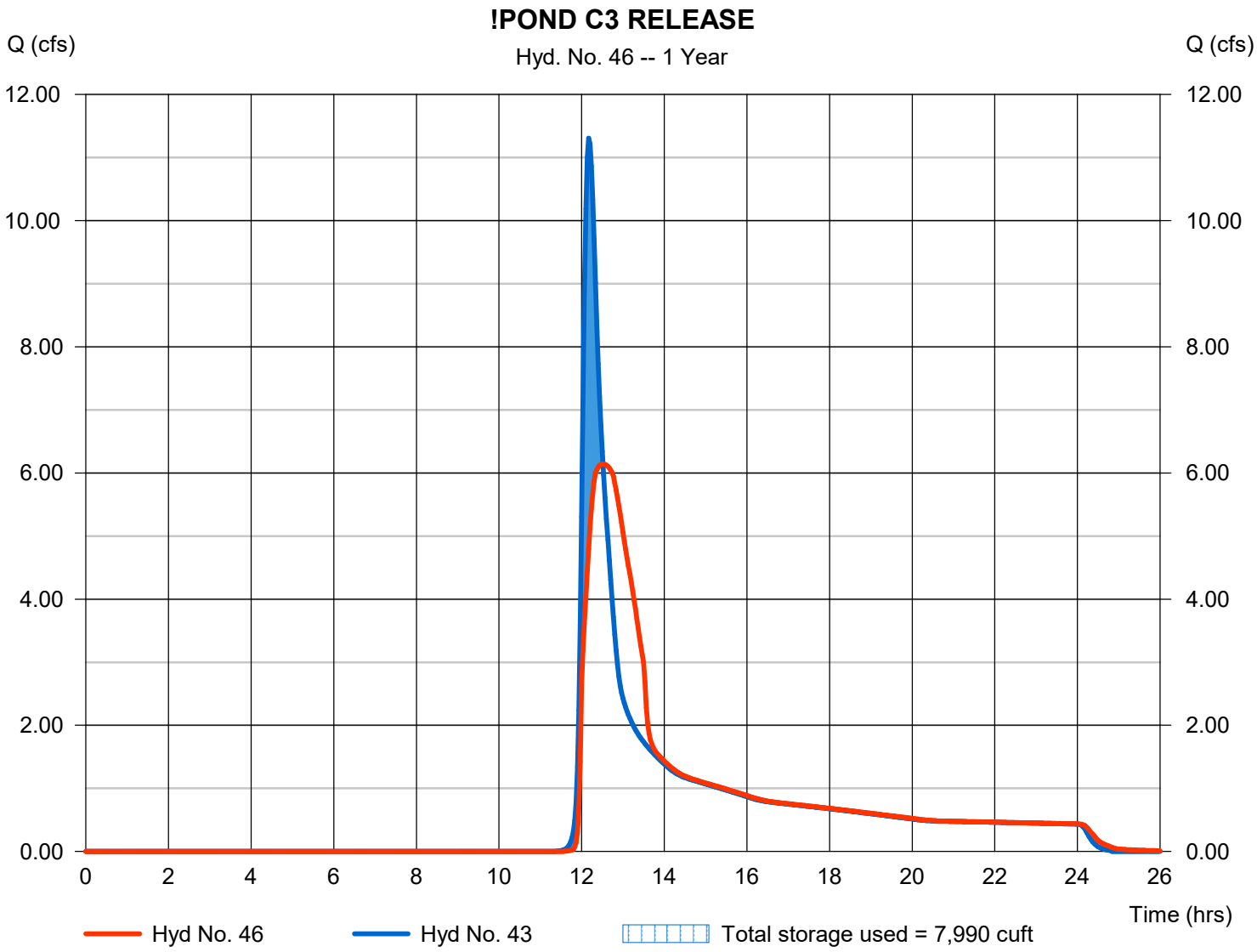
Hydrograph Report

Hyd. No. 46

!POND C3 RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	6.144 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.53 hrs
Time interval	=	2 min	Hyd. volume	=	56,083 cuft
Inflow hyd. No.	=	43 - REACH TO POND C3	Max. Elevation	=	938.07 ft
Reservoir name	=	POND C3	Max. Storage	=	7,990 cuft

Storage Indication method used.



Pond Report

Pond No. 11 - POND C3

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 936.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	936.00	00	0	0
1.00	937.00	3,100	1,033	1,033
2.00	938.00	9,400	5,965	6,999
3.00	939.00	18,500	13,694	20,693
4.00	940.00	28,780	23,449	44,142
5.00	941.00	40,300	34,375	78,518
6.00	942.00	51,500	45,781	124,299

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 30.00	15.00	0.00	0.00
Span (in)	= 30.00	15.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 936.00	936.00	0.00	0.00
Length (ft)	= 50.00	10.00	0.00	0.00
Slope (%)	= 1.00	1.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 7.85	25.00	0.00	0.00
Crest El. (ft)	= 939.25	941.50	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Ciplti	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

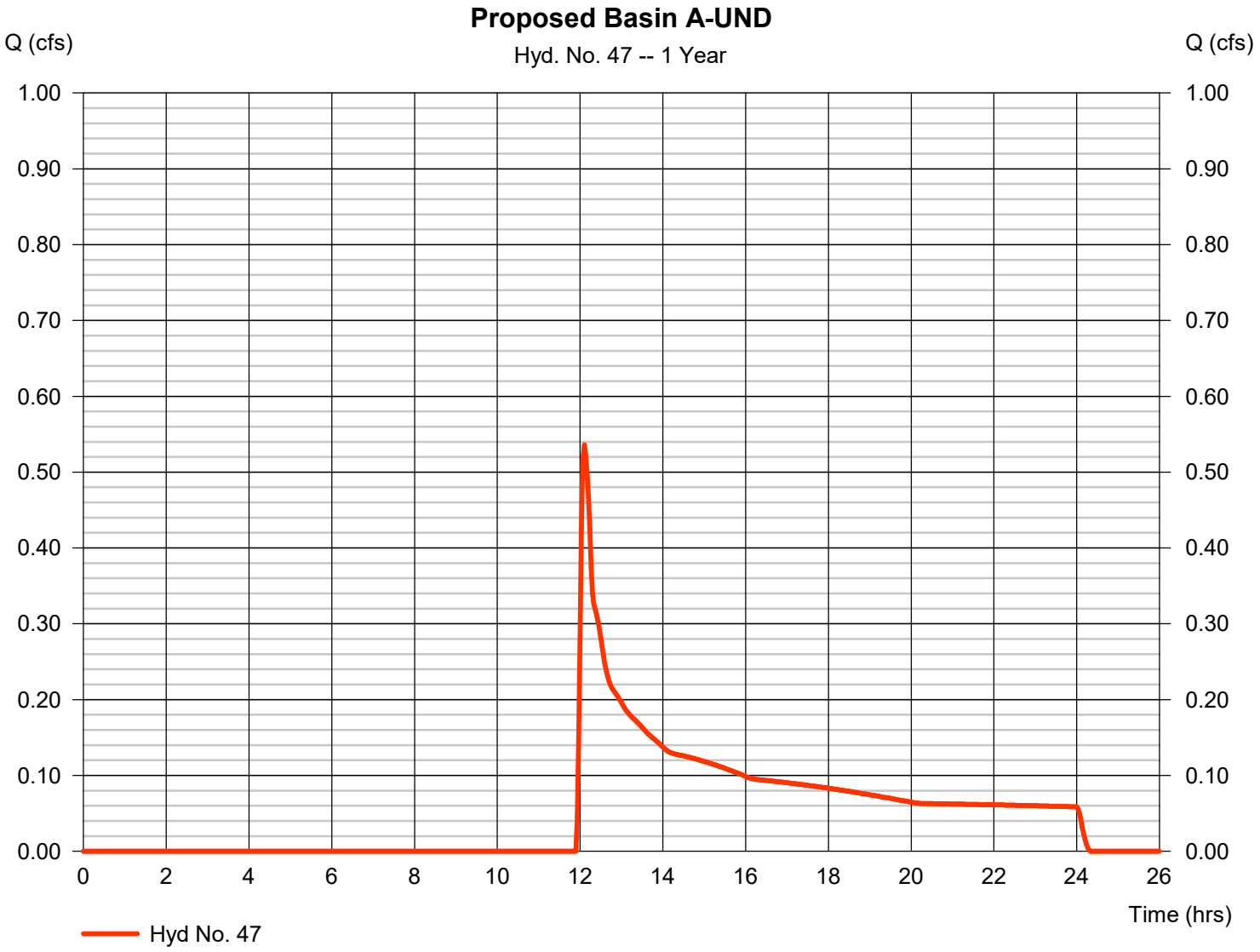
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	936.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.00	1,033	937.00	3.02 ic	2.93 ic	---	---	0.00	0.00	---	---	---	---	2.933
2.00	6,999	938.00	5.98 ic	5.98 ic	---	---	0.00	0.00	---	---	---	---	5.980
3.00	20,693	939.00	8.05 ic	8.05 ic	---	---	0.00	0.00	---	---	---	---	8.048
4.00	44,142	940.00	23.69 oc	6.71 ic	---	---	16.98	0.00	---	---	---	---	23.69
5.00	78,518	941.00	43.20 ic	3.77 ic	---	---	39.43 s	0.00	---	---	---	---	43.20
6.00	124,299	942.00	50.54 ic	2.48 ic	---	---	48.06 s	29.43	---	---	---	---	79.97

Hydrograph Report

Hyd. No. 47

Proposed Basin A-UND

Hydrograph type	= SCS Runoff	Peak discharge	= 0.536 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 4,691 cuft
Drainage area	= 7.130 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

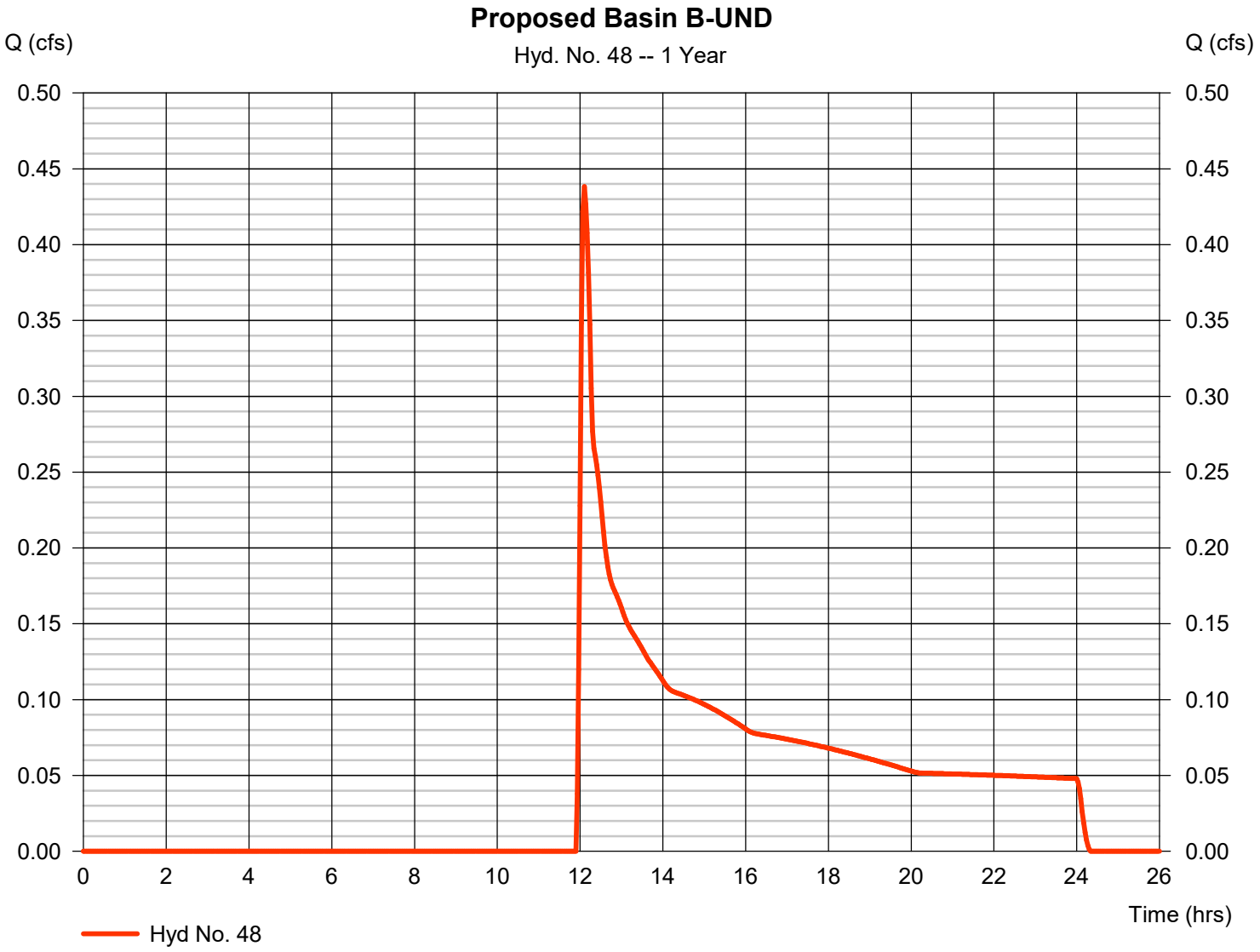


Hydrograph Report

Hyd. No. 48

Proposed Basin B-UND

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.438 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	3,835 cuft
Drainage area	=	5.830 ac	Curve number	=	58
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

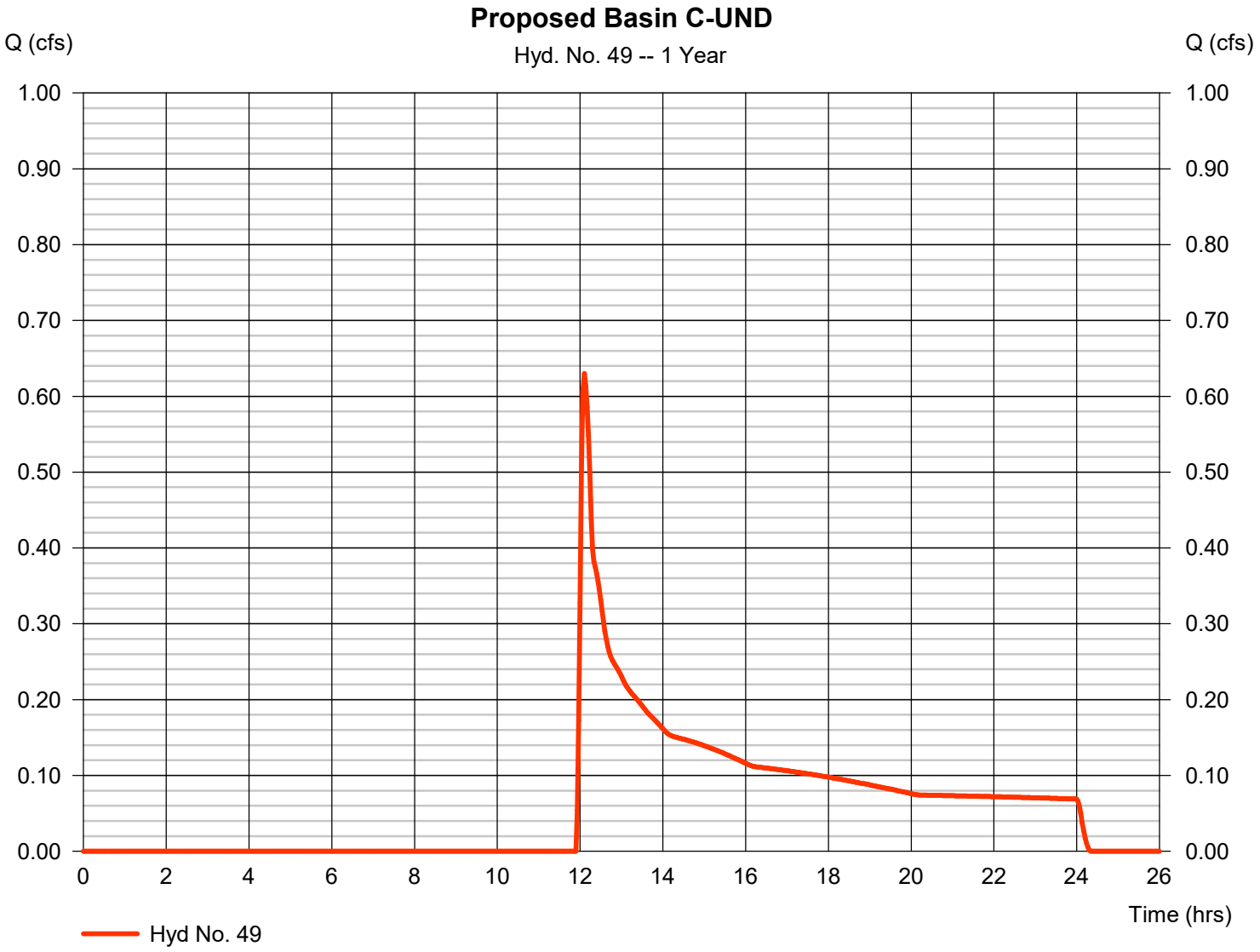


Hydrograph Report

Hyd. No. 49

Proposed Basin C-UND

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.630 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	5,513 cuft
Drainage area	=	8.380 ac	Curve number	=	58
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



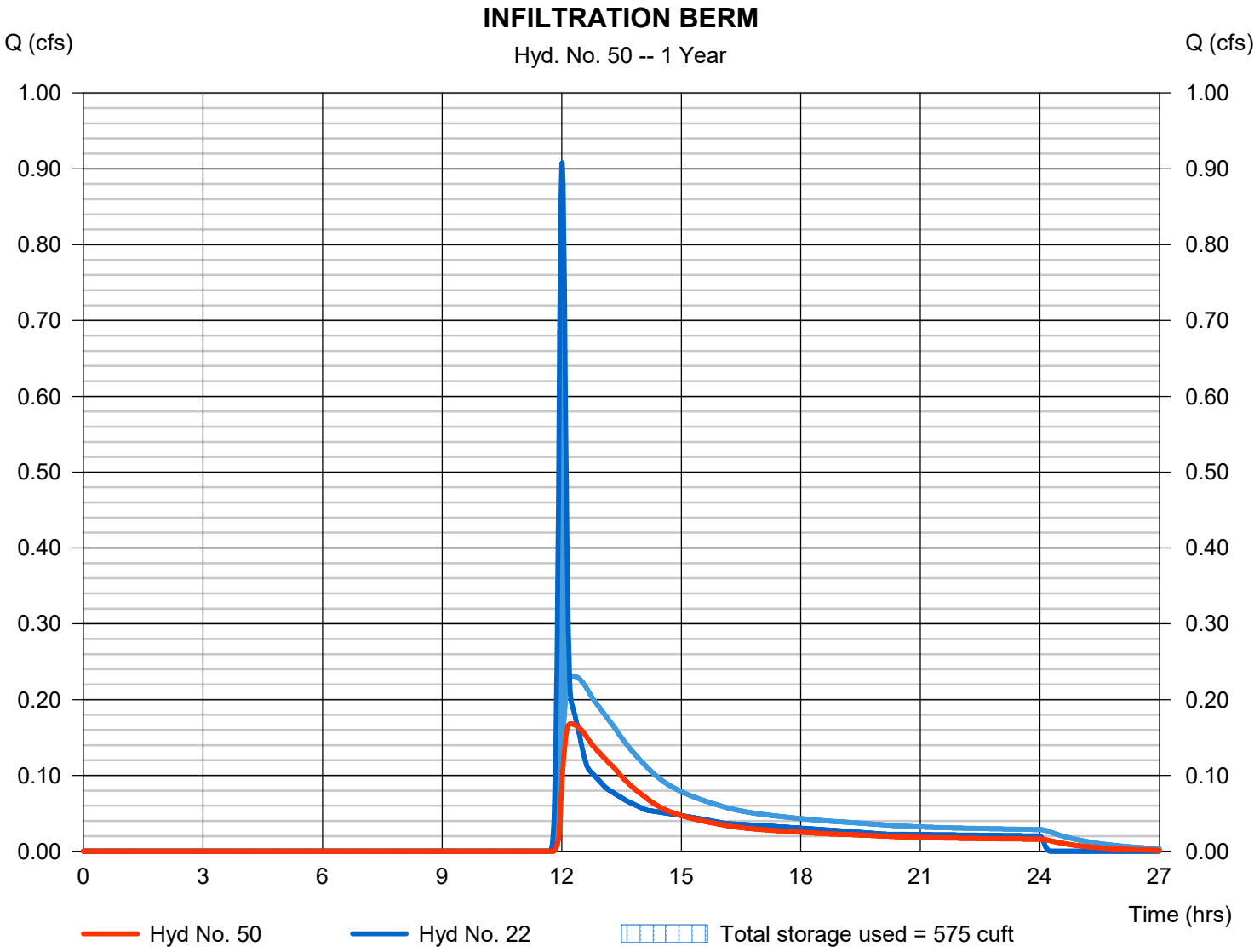
Hydrograph Report

Hyd. No. 50

INFILTRATION BERM

Hydrograph type	=	Reservoir	Peak discharge	=	0.168 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.23 hrs
Time interval	=	1 min	Hyd. volume	=	1,957 cuft
Inflow hyd. No.	=	22 - PROPOSED BASIN B (LOTS 10-11)	Max. Elevation	=	945.48 ft
Reservoir name	=	LOT 10 11	Max. Storage	=	575 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 14 - LOT 10 11

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 945.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	945.00	1,100	0	0
1.00	946.00	1,320	1,208	1,208
1.50	946.50	1,430	687	1,895
2.00	947.00	1,600	757	2,652

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 4.00	0.00	0.00	0.00
Span (in)	= 4.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 945.00	0.00	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 200.00	0.00	0.00	0.00
Crest El. (ft)	= 946.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 2.410 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	945.00	0.00	---	---	---	0.00	---	---	---	0.000	---	0.000
1.00	1,208	946.00	0.30 oc	---	---	---	0.00	---	---	---	0.074	---	0.374
1.50	1,895	946.50	0.39 oc	---	---	---	0.00	---	---	---	0.080	---	0.466
2.00	2,652	947.00	0.46 oc	---	---	---	183.85	---	---	---	0.089	---	184.39

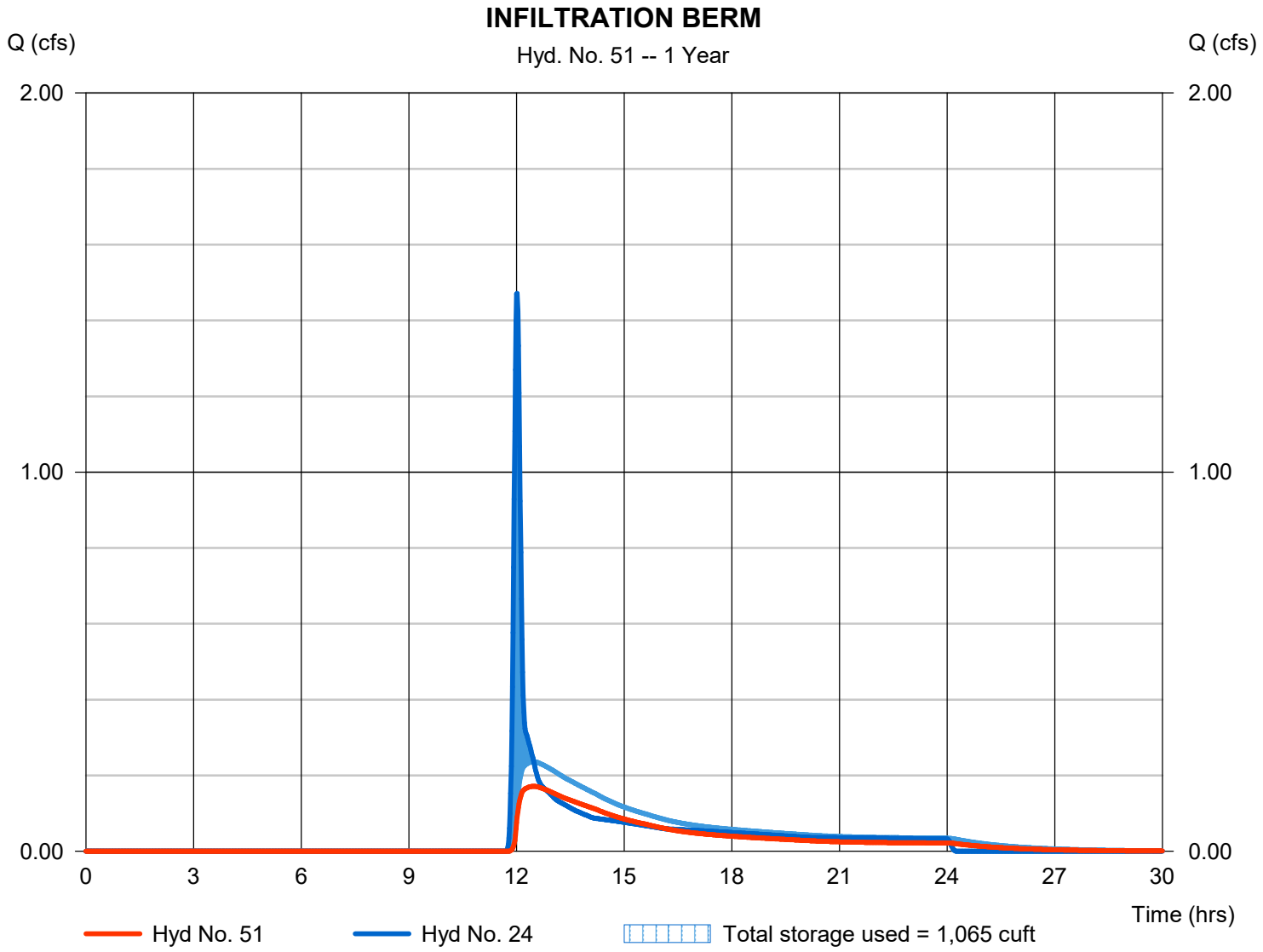
Hydrograph Report

Hyd. No. 51

INFILTRATION BERM

Hydrograph type	=	Reservoir	Peak discharge	=	0.171 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.48 hrs
Time interval	=	1 min	Hyd. volume	=	2,775 cuft
Inflow hyd. No.	=	24 - PROPOSED BASIN B (LOTS 51-52)	Max. Elevation	=	940.48 ft
Reservoir name	=	LOT 51 52	Max. Storage	=	1,065 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 15 - LOT 51 52

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 940.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	940.00	2,000	0	0
1.00	941.00	2,400	2,197	2,197
1.50	941.50	2,600	1,250	3,446
2.00	942.00	2,800	1,350	4,796

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 4.00	0.00	0.00	0.00
Span (in)	= 4.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 940.00	0.00	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 400.00	0.00	0.00	0.00
Crest El. (ft)	= 941.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 2.410 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	940.00	0.00	---	---	---	0.00	---	---	---	0.000	---	0.000
1.00	2,197	941.00	0.30 oc	---	---	---	0.00	---	---	---	0.134	---	0.434
1.50	3,446	941.50	0.39 oc	---	---	---	0.00	---	---	---	0.145	---	0.531
2.00	4,796	942.00	0.46 oc	---	---	---	367.70	---	---	---	0.156	---	368.31

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	137.32	2	864	2,696,955	------	------	------	Off-Site Basin B (upper)
2	SCS Runoff	4.601	2	726	14,730	------	------	------	Off-Site Basin C1
3	SCS Runoff	9.540	2	736	44,565	------	------	------	Off-Site Basin C2
4	SCS Runoff	59.04	2	784	644,578	------	------	------	Off-Site Basin B (lower)
5	Reservoir	37.57	2	848	346,928	4	956.37	311,722	Offsite Field Storage
6	SCS Runoff	14.82	2	748	94,714	------	------	------	EXISTING BASIN A
7	SCS Runoff	36.45	2	746	225,586	------	------	------	EXISTING BASIN B
8	SCS Runoff	15.90	2	742	88,143	------	------	------	EXISTING BASIN C
9	SCS Runoff	10.47	2	728	37,089	------	------	------	EXISTING BASIN D
10	SCS Runoff	4.798	2	718	9,605	------	------	------	EXISTING BASIN E
11	SCS Runoff	6.942	2	760	61,741	------	------	------	PROPOSED BASIN A
12	SCS Runoff	18.52	2	756	148,535	------	------	------	PROPOSED BASIN B
13	SCS Runoff	5.958	2	754	52,508	------	------	------	PROPOSED BASIN C
14	SCS Runoff	4.016	2	732	17,454	------	------	------	PROPOSED BASIN D
15	SCS Runoff	3.487	2	720	8,089	------	------	------	PROPOSED BASIN E
16	Reservoir	1.276	2	896	61,728	11	933.36	27,031	!POND A RELEASE
17	SCS Runoff	8.777	2	724	26,894	------	------	------	PROPOSED BASIN B1
18	SCS Runoff	8.407	2	736	43,086	------	------	------	PROPOSED BASIN B2
19	SCS Runoff	3.817	2	732	17,434	------	------	------	PROPOSED BASIN B3
20	SCS Runoff	5.035	2	726	17,231	------	------	------	PROPOSED BASIN B4
21	SCS Runoff	2.557	2	728	9,777	------	------	------	PROPOSED BASIN B5
22	SCS Runoff	2.448	1	720	5,719	------	------	------	PROPOSED BASIN B (LOTS 10-11)
23	SCS Runoff	1.393	2	724	4,093	------	------	------	PROPOSED BASIN B (LOTS 22-23)
24	SCS Runoff	3.967	1	720	9,269	------	------	------	PROPOSED BASIN B (LOTS 51-52)
25	SCS Runoff	1.651	2	730	7,004	------	------	------	PROPOSED BASIN B (UND TO DAM
26	Reservoir	1.153	2	760	24,953	17	935.99	9,523	!POND B1 RELEASE
27	Reservoir	4.517	2	760	40,934	18	939.49	8,878	POND B2 RELEASE
28	Diversion1	48.00	2	766	1,715,593	1	------	------	Pass Through 170th
29	Diversion2	89.32	2	864	981,361	1	------	------	Field Storage Volume
30	Reservoir	48.00	2	884	1,637,068	28	957.83	114,247	Offsite Field Storage
31	Combine	85.57	2	848	1,983,995	5, 30	------	------	Off-Site B Flow
32	Reach	84.97	2	854	1,983,983	31	------	------	REACH TO DAM
33	Reservoir	0.549	2	802	17,430	19	939.00	6,697	POND B3 RELEASE
34	SCS Runoff	2.888	2	728	11,458	------	------	------	PROPOSED BASIN C1

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

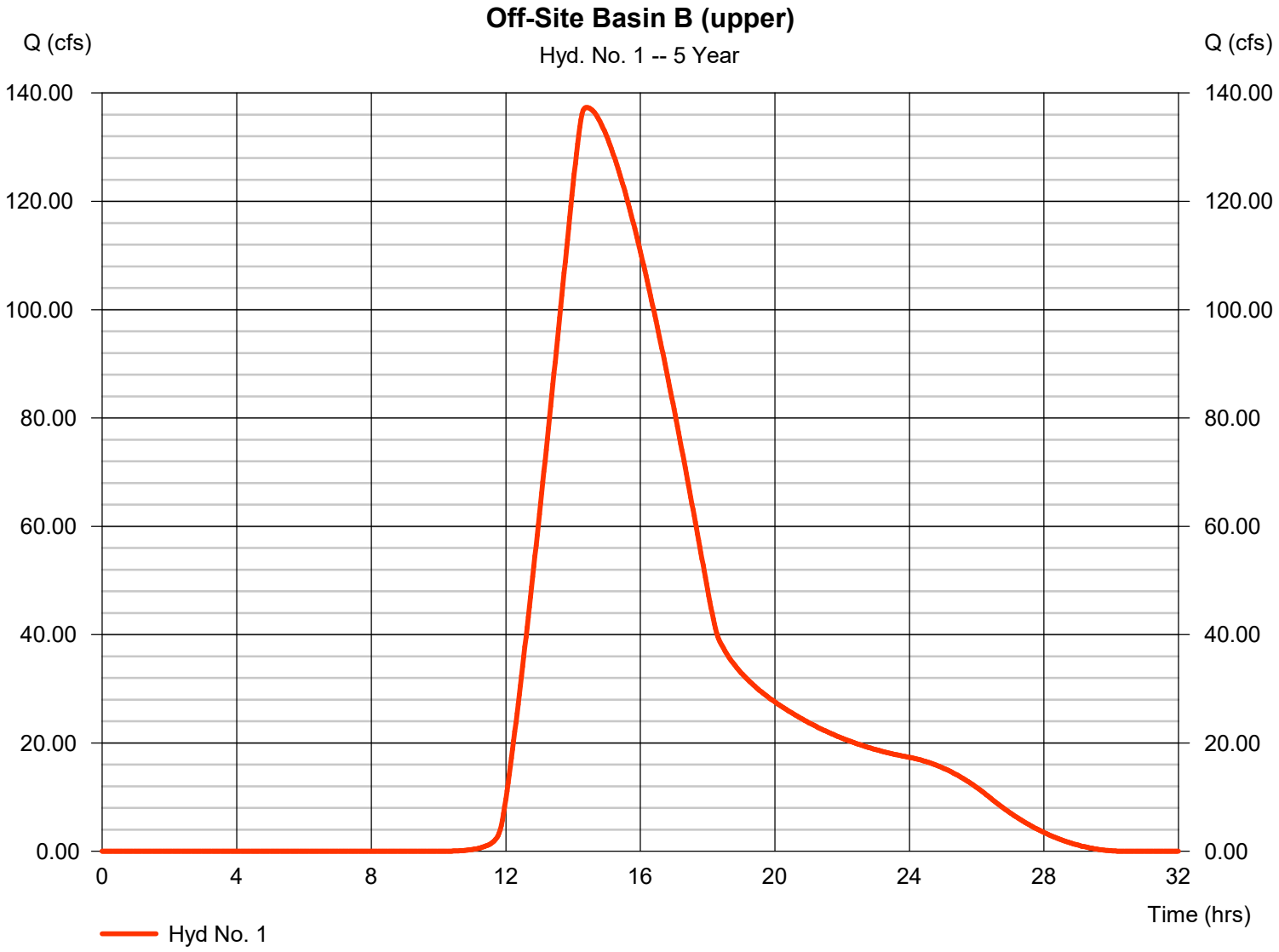
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
35	Combine	7.403	2	726	26,188	2, 34	------	------	FLOW TO POND C1
36	Combine	7.535	2	726	27,008	20, 21,	------	------	COMBINE B4 B5
37	Reach	6.271	2	734	27,004	36	------	------	REACH TO DAM
38	Combine	86.83	2	854	2,063,017	23, 25, 27, 32, 37	------	------	TOTAL FLOW TO DAM
39	Reservoir	81.93	2	870	1,904,853	38	942.99	227,590	!DAM RELEASE
40	SCS Runoff	5.334	2	722	14,686	------	------	------	BASIN C2
41	SCS Runoff	13.02	2	724	39,893	------	------	------	BASIN C3
42	Combine	31.88	2	724	125,332	3, 35, 40, 41	------	------	TOTAL FLOW TO POND C3
43	Reach	31.24	2	728	125,330	42	------	------	REACH TO POND C3
44	SCS Runoff	6.662	2	722	17,999	------	------	------	!BASIN D1
45	SCS Runoff	3.111	2	722	8,342	------	------	------	!BASIN E1
46	Reservoir	11.63	2	754	125,327	43	939.49	32,224	!POND C3 RELEASE
47	SCS Runoff	4.474	2	722	15,502	------	------	------	Proposed Basin A-UND
48	SCS Runoff	3.658	2	722	12,675	------	------	------	Proposed Basin B-UND
49	SCS Runoff	5.258	2	722	18,219	------	------	------	Proposed Basin C-UND
50	Reservoir	0.375	1	734	4,657	22	946.43	1,802	INFILTRATION BERM
51	Reservoir	0.375	1	748	6,601	24	941.43	3,265	INFILTRATION BERM

Hydrograph Report

Hyd. No. 1

Off-Site Basin B (upper)

Hydrograph type	= SCS Runoff	Peak discharge	= 137.32 cfs
Storm frequency	= 5 yrs	Time to peak	= 14.40 hrs
Time interval	= 2 min	Hyd. volume	= 2,696,955 cuft
Drainage area	= 487.010 ac	Curve number	= 75
Basin Slope	= 0.8 %	Hydraulic length	= 8797 ft
Tc method	= LAG	Time of conc. (Tc)	= 243.10 min
Total precip.	= 3.81 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

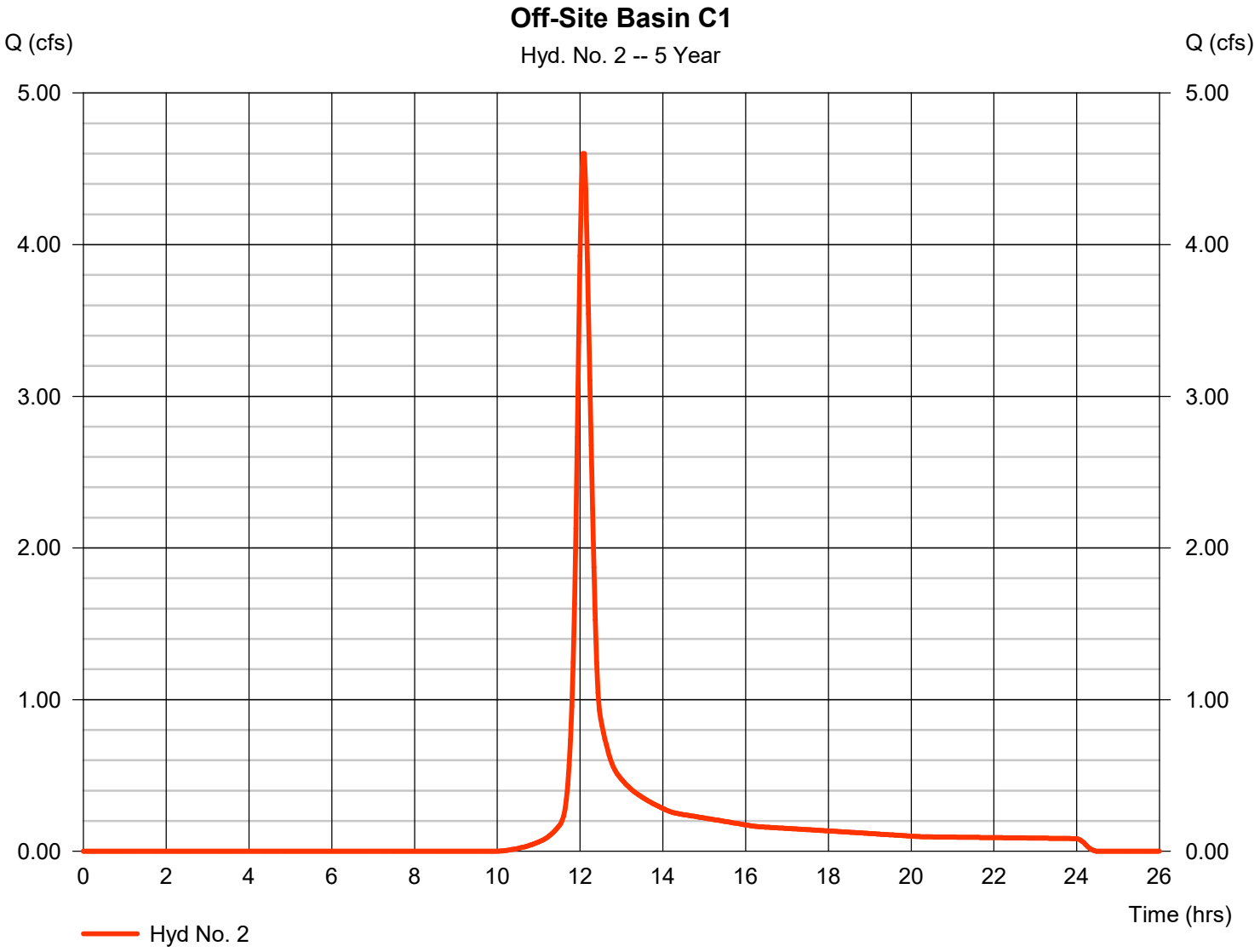


Hydrograph Report

Hyd. No. 2

Off-Site Basin C1

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.601 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	14,730 cuft
Drainage area	=	2.660 ac	Curve number	=	75
Basin Slope	=	0.8 %	Hydraulic length	=	392 ft
Tc method	=	LAG	Time of conc. (Tc)	=	20.10 min
Total precip.	=	3.81 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

Hyd. No. 3

Off-Site Basin C2

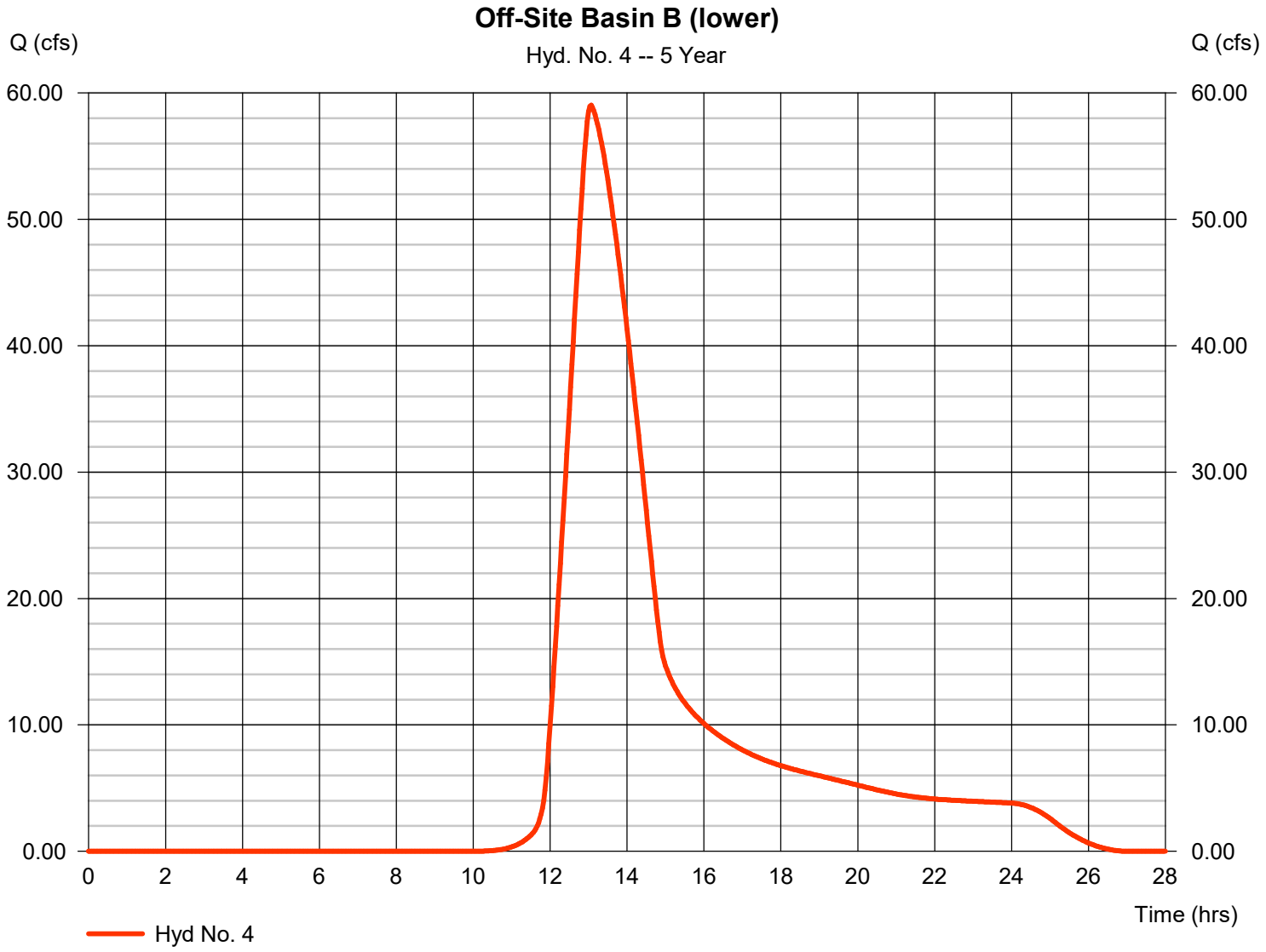
Hydrograph type	=	SCS Runoff	Peak discharge	=	9.540 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.27 hrs
Time interval	=	2 min	Hyd. volume	=	44,565 cuft
Drainage area	=	8.140 ac	Curve number	=	75
Basin Slope	=	0.8 %	Hydraulic length	=	820 ft
Tc method	=	LAG	Time of conc. (Tc)	=	36.40 min
Total precip.	=	3.81 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

Hydrograph Report

Hyd. No. 4

Off-Site Basin B (lower)

Hydrograph type	=	SCS Runoff	Peak discharge	=	59.04 cfs
Storm frequency	=	5 yrs	Time to peak	=	13.07 hrs
Time interval	=	2 min	Hyd. volume	=	644,578 cuft
Drainage area	=	115.970 ac	Curve number	=	75
Basin Slope	=	0.8 %	Hydraulic length	=	3400 ft
Tc method	=	LAG	Time of conc. (Tc)	=	113.60 min
Total precip.	=	3.81 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

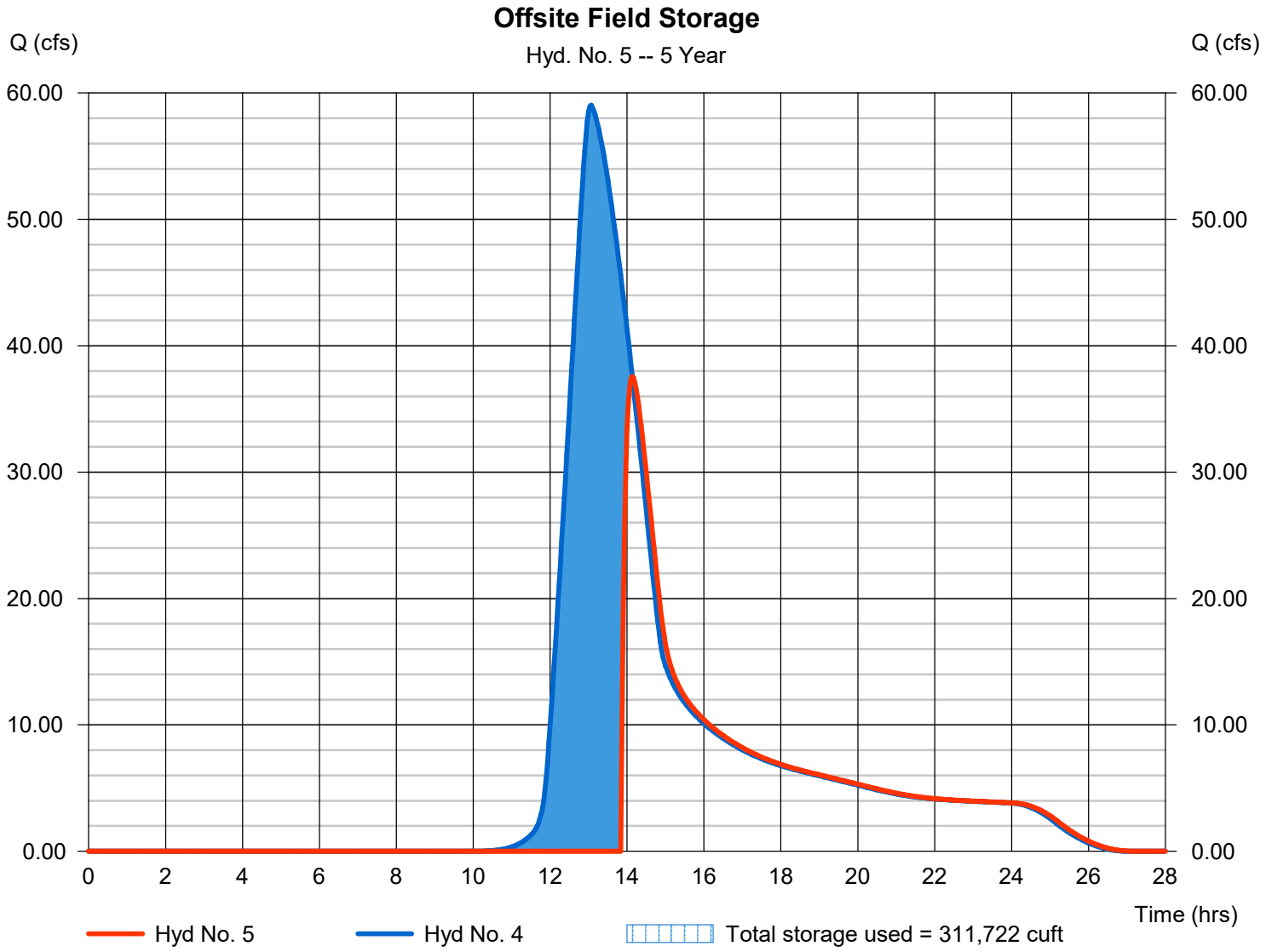
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 03 / 13 / 2020

Hyd. No. 5

Offsite Field Storage

Hydrograph type	= Reservoir	Peak discharge	= 37.57 cfs
Storm frequency	= 5 yrs	Time to peak	= 14.13 hrs
Time interval	= 2 min	Hyd. volume	= 346,928 cuft
Inflow hyd. No.	= 4 - Off-Site Basin B (lower)	Max. Elevation	= 956.37 ft
Reservoir name	= Offsite Field Storage LOWER	Max. Storage	= 311,722 cuft

Storage Indication method used.

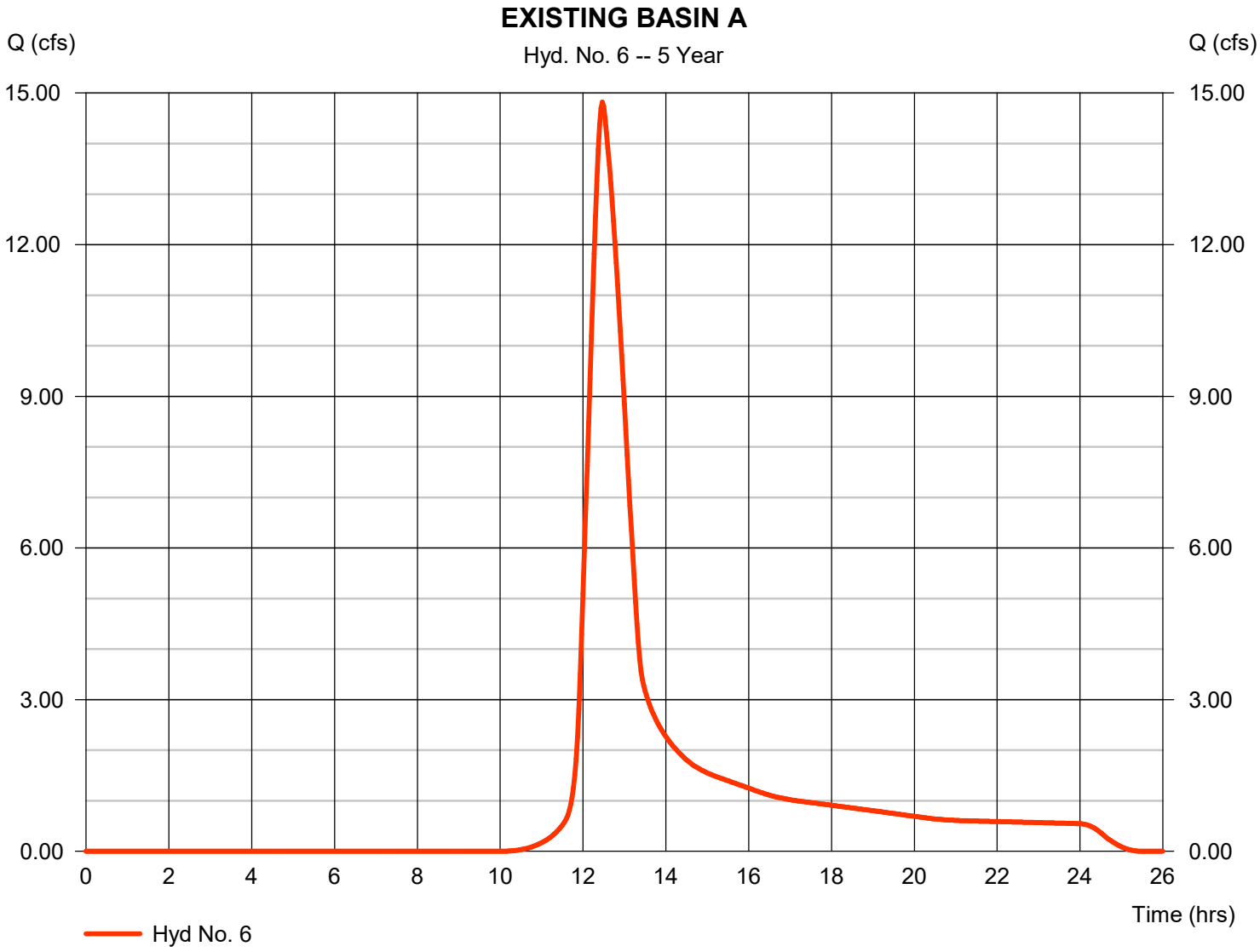


Hydrograph Report

Hyd. No. 6

EXISTING BASIN A

Hydrograph type	=	SCS Runoff	Peak discharge	=	14.82 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.47 hrs
Time interval	=	2 min	Hyd. volume	=	94,714 cuft
Drainage area	=	17.230 ac	Curve number	=	75
Basin Slope	=	1.8 %	Hydraulic length	=	2500 ft
Tc method	=	LAG	Time of conc. (Tc)	=	57.00 min
Total precip.	=	3.81 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

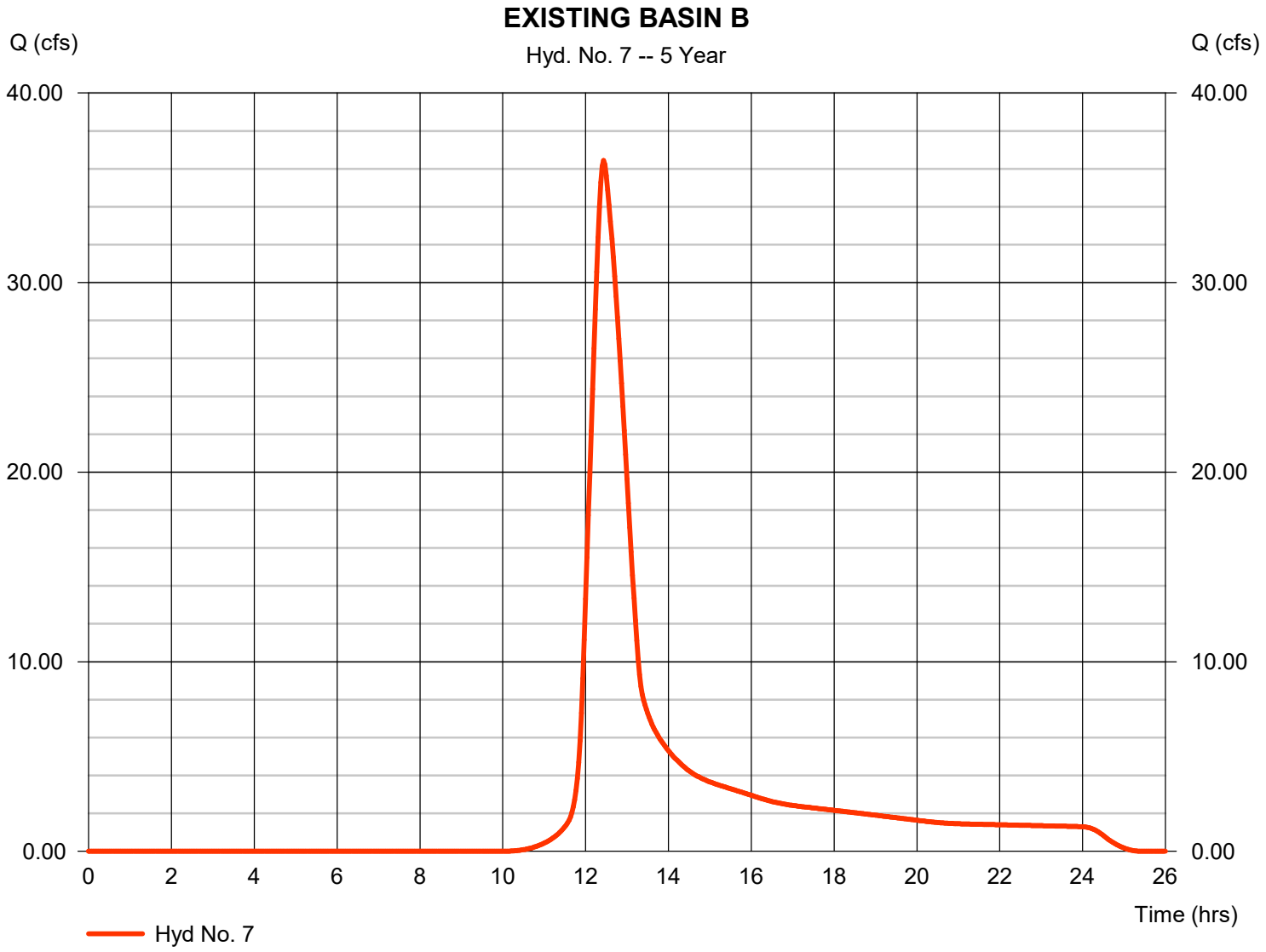


Hydrograph Report

Hyd. No. 7

EXISTING BASIN B

Hydrograph type	=	SCS Runoff	Peak discharge	=	36.45 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.43 hrs
Time interval	=	2 min	Hyd. volume	=	225,586 cuft
Drainage area	=	40.420 ac	Curve number	=	75
Basin Slope	=	1.1 %	Hydraulic length	=	1712 ft
Tc method	=	LAG	Time of conc. (Tc)	=	53.40 min
Total precip.	=	3.81 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

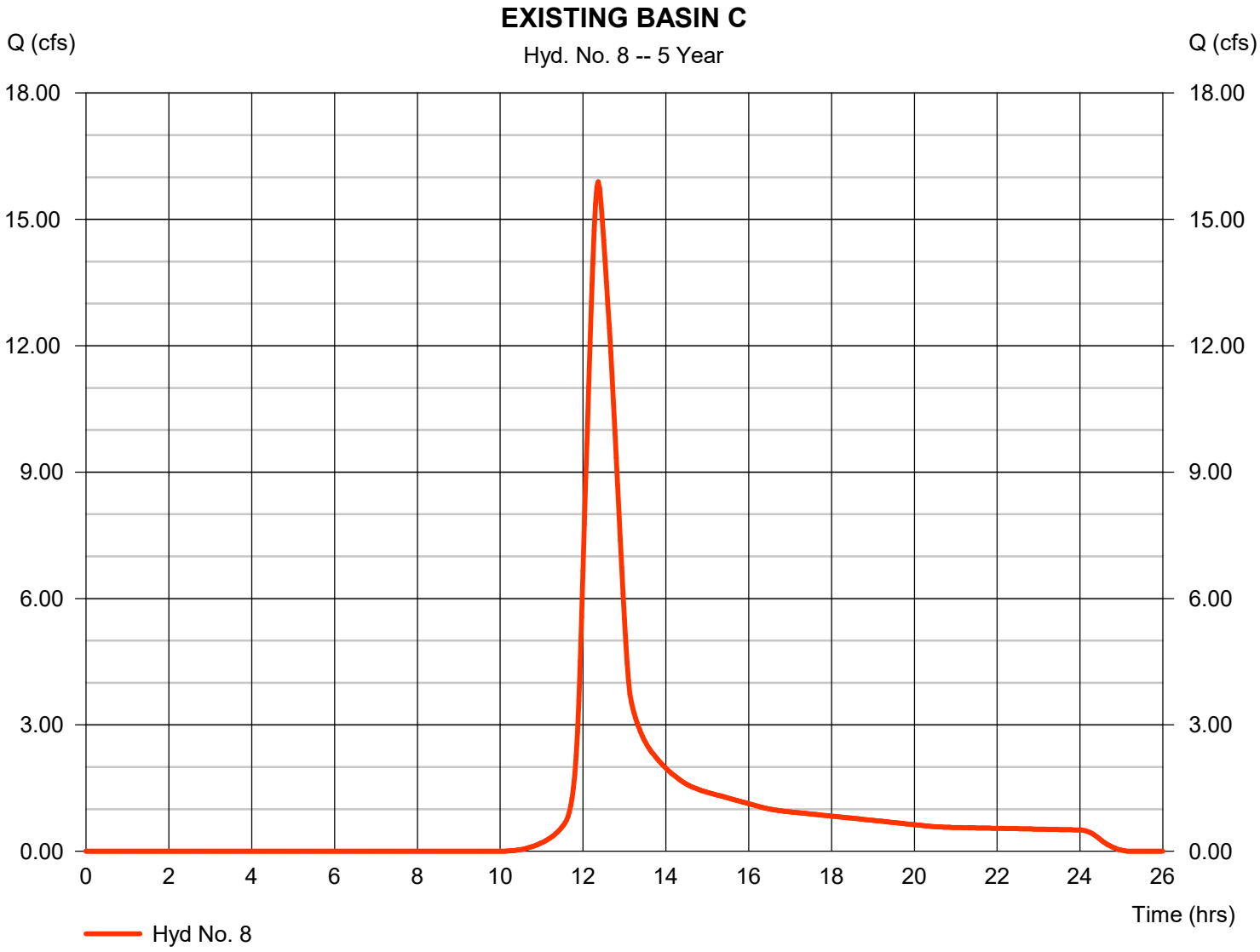


Hydrograph Report

Hyd. No. 8

EXISTING BASIN C

Hydrograph type	=	SCS Runoff	Peak discharge	=	15.90 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.37 hrs
Time interval	=	2 min	Hyd. volume	=	88,143 cuft
Drainage area	=	16.060 ac	Curve number	=	75
Basin Slope	=	1.8 %	Hydraulic length	=	1825 ft
Tc method	=	LAG	Time of conc. (Tc)	=	44.10 min
Total precip.	=	3.81 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

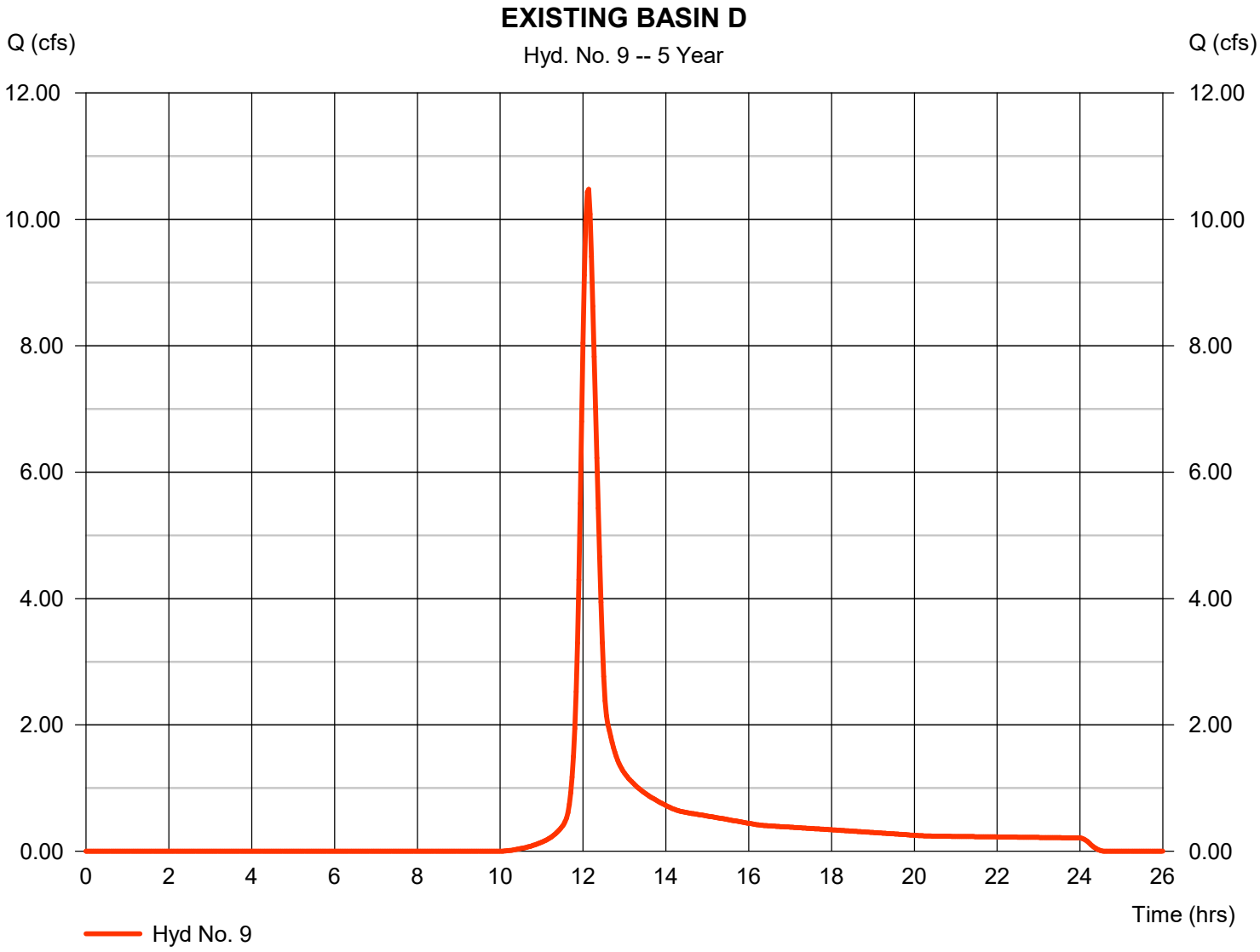


Hydrograph Report

Hyd. No. 9

EXISTING BASIN D

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.47 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.13 hrs
Time interval	=	2 min	Hyd. volume	=	37,089 cuft
Drainage area	=	6.580 ac	Curve number	=	75
Basin Slope	=	2.4 %	Hydraulic length	=	970 ft
Tc method	=	LAG	Time of conc. (Tc)	=	23.40 min
Total precip.	=	3.81 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

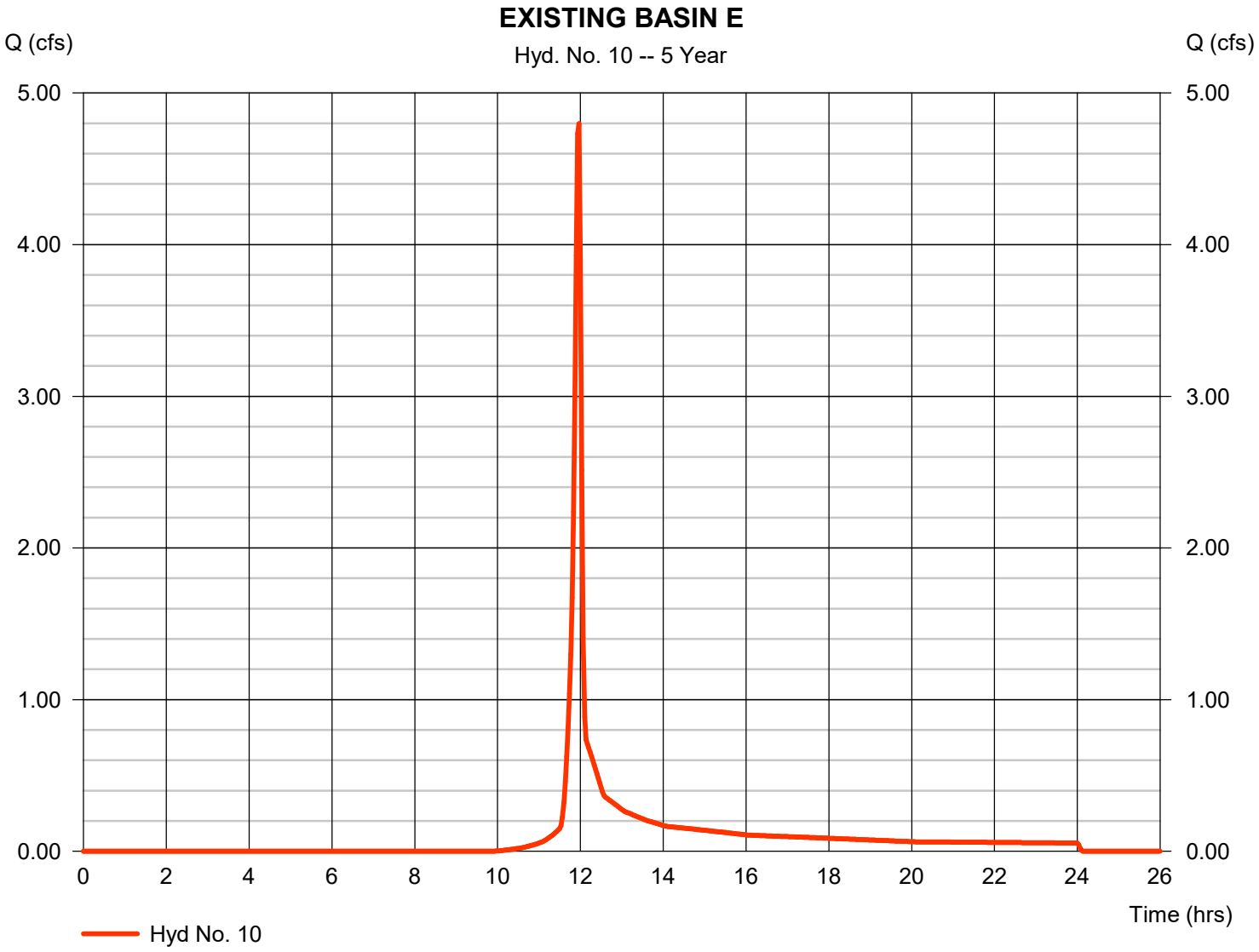


Hydrograph Report

Hyd. No. 10

EXISTING BASIN E

Hydrograph type	= SCS Runoff	Peak discharge	= 4.798 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 9,605 cuft
Drainage area	= 1.850 ac	Curve number	= 75
Basin Slope	= 2.1 %	Hydraulic length	= 175 ft
Tc method	= LAG	Time of conc. (Tc)	= 6.20 min
Total precip.	= 3.81 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

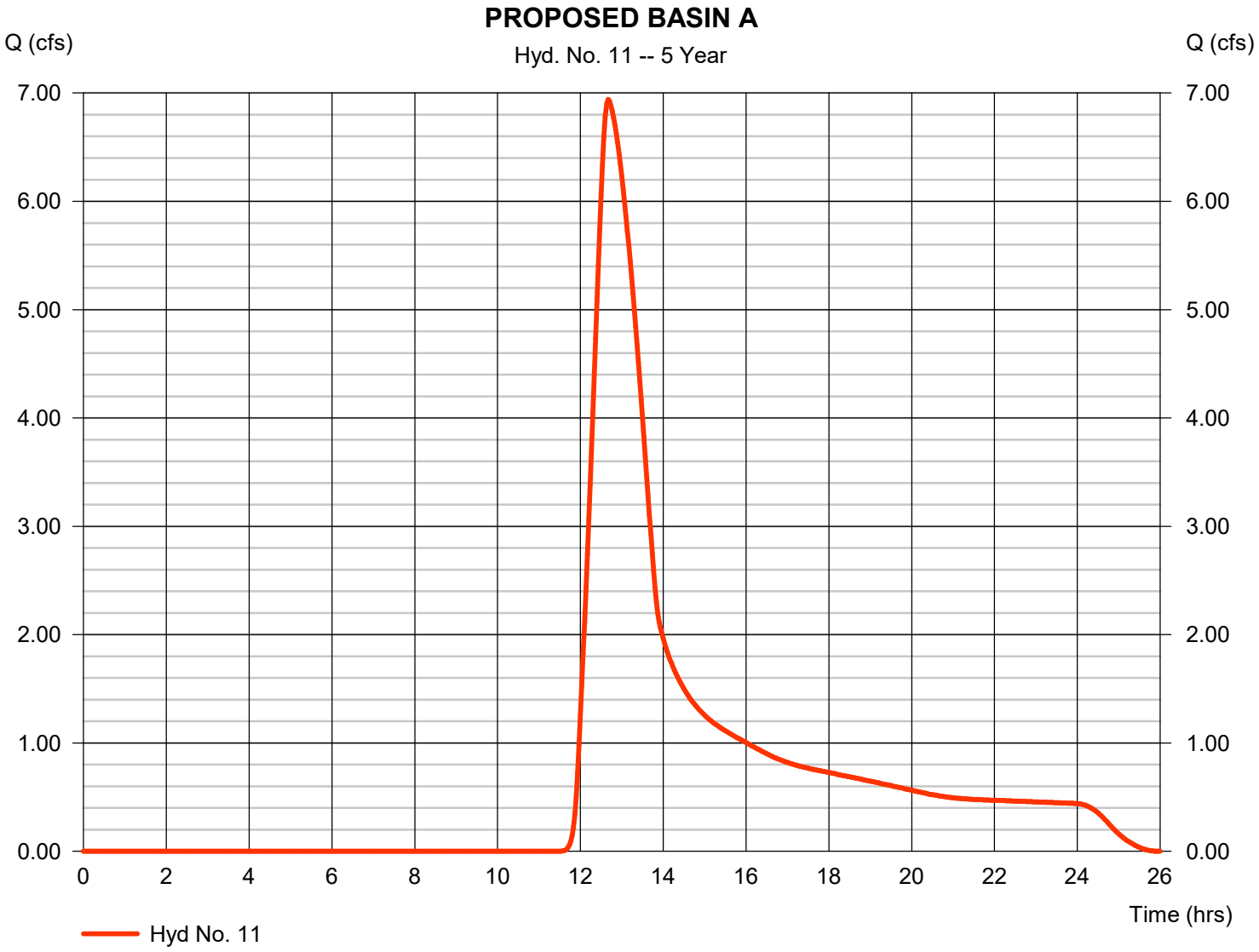


Hydrograph Report

Hyd. No. 11

PROPOSED BASIN A

Hydrograph type	= SCS Runoff	Peak discharge	= 6.942 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.67 hrs
Time interval	= 2 min	Hyd. volume	= 61,741 cuft
Drainage area	= 17.360 ac	Curve number	= 66
Basin Slope	= 1.8 %	Hydraulic length	= 2500 ft
Tc method	= LAG	Time of conc. (Tc)	= 72.80 min
Total precip.	= 3.81 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

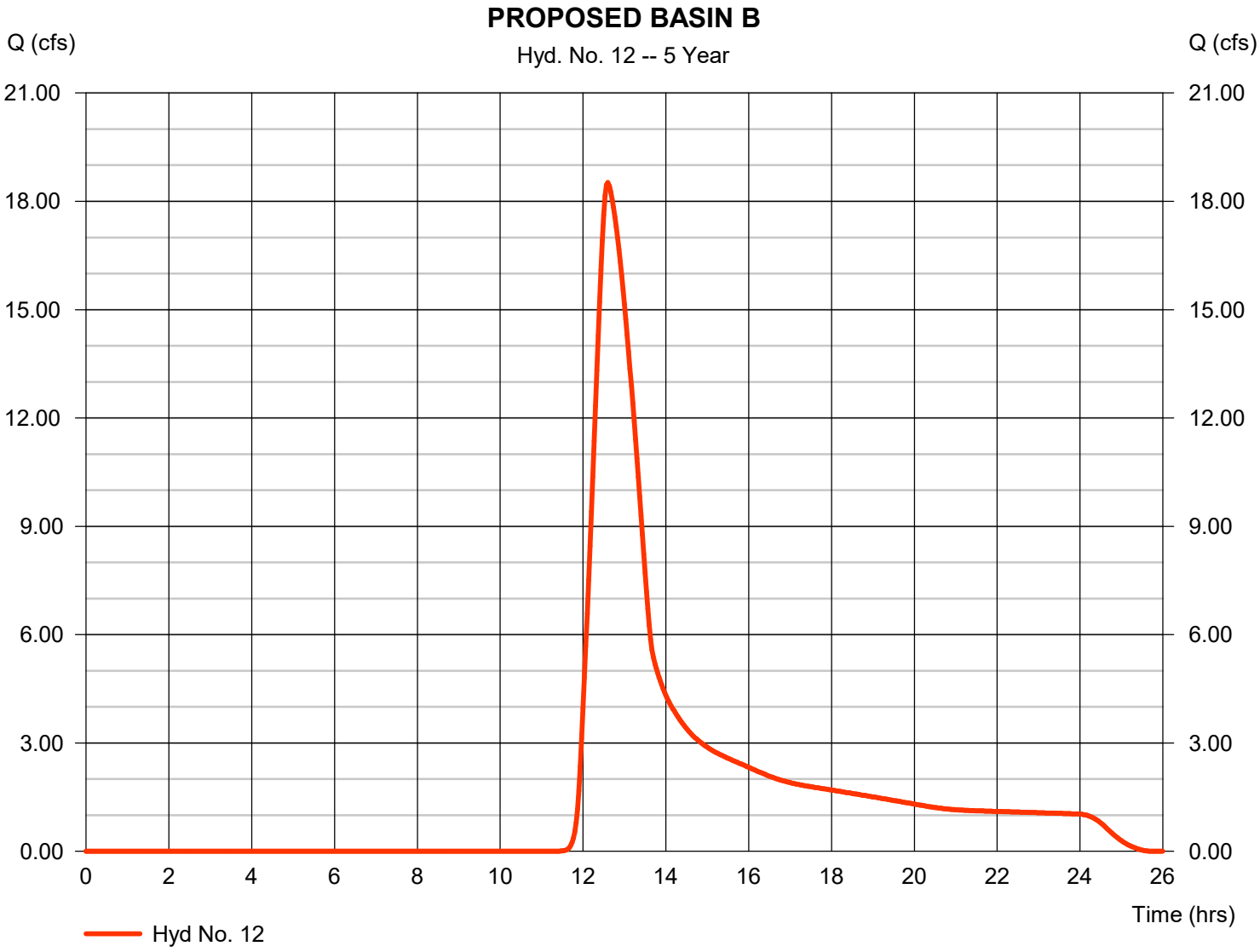


Hydrograph Report

Hyd. No. 12

PROPOSED BASIN B

Hydrograph type	=	SCS Runoff	Peak discharge	=	18.52 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.60 hrs
Time interval	=	2 min	Hyd. volume	=	148,535 cuft
Drainage area	=	39.990 ac	Curve number	=	67
Basin Slope	=	1.1 %	Hydraulic length	=	1712 ft
Tc method	=	LAG	Time of conc. (Tc)	=	66.50 min
Total precip.	=	3.81 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

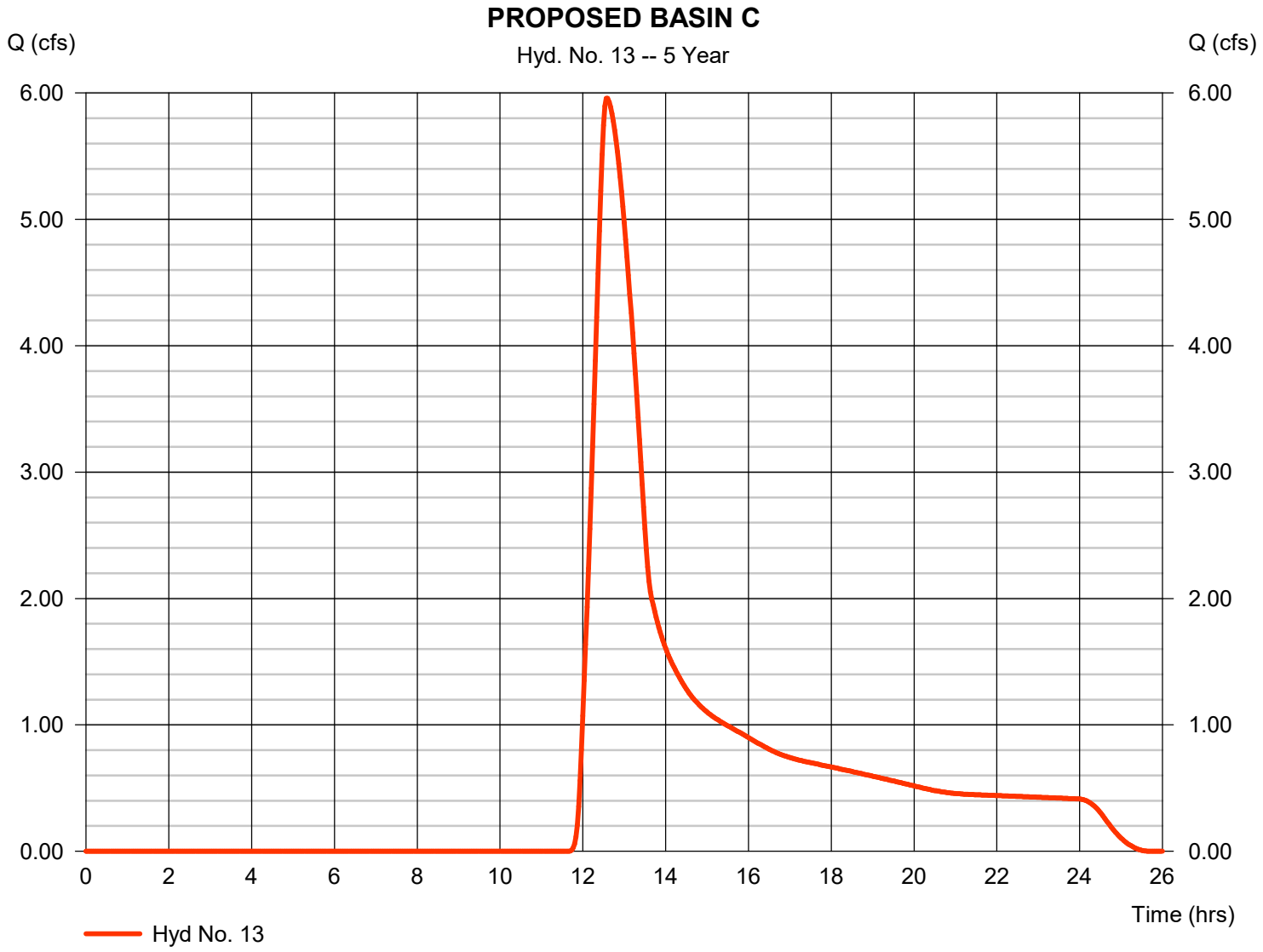


Hydrograph Report

Hyd. No. 13

PROPOSED BASIN C

Hydrograph type	= SCS Runoff	Peak discharge	= 5.958 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.57 hrs
Time interval	= 2 min	Hyd. volume	= 52,508 cuft
Drainage area	= 18.750 ac	Curve number	= 62
Basin Slope	= 1.8 %	Hydraulic length	= 1825 ft
Tc method	= LAG	Time of conc. (Tc)	= 62.40 min
Total precip.	= 3.81 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

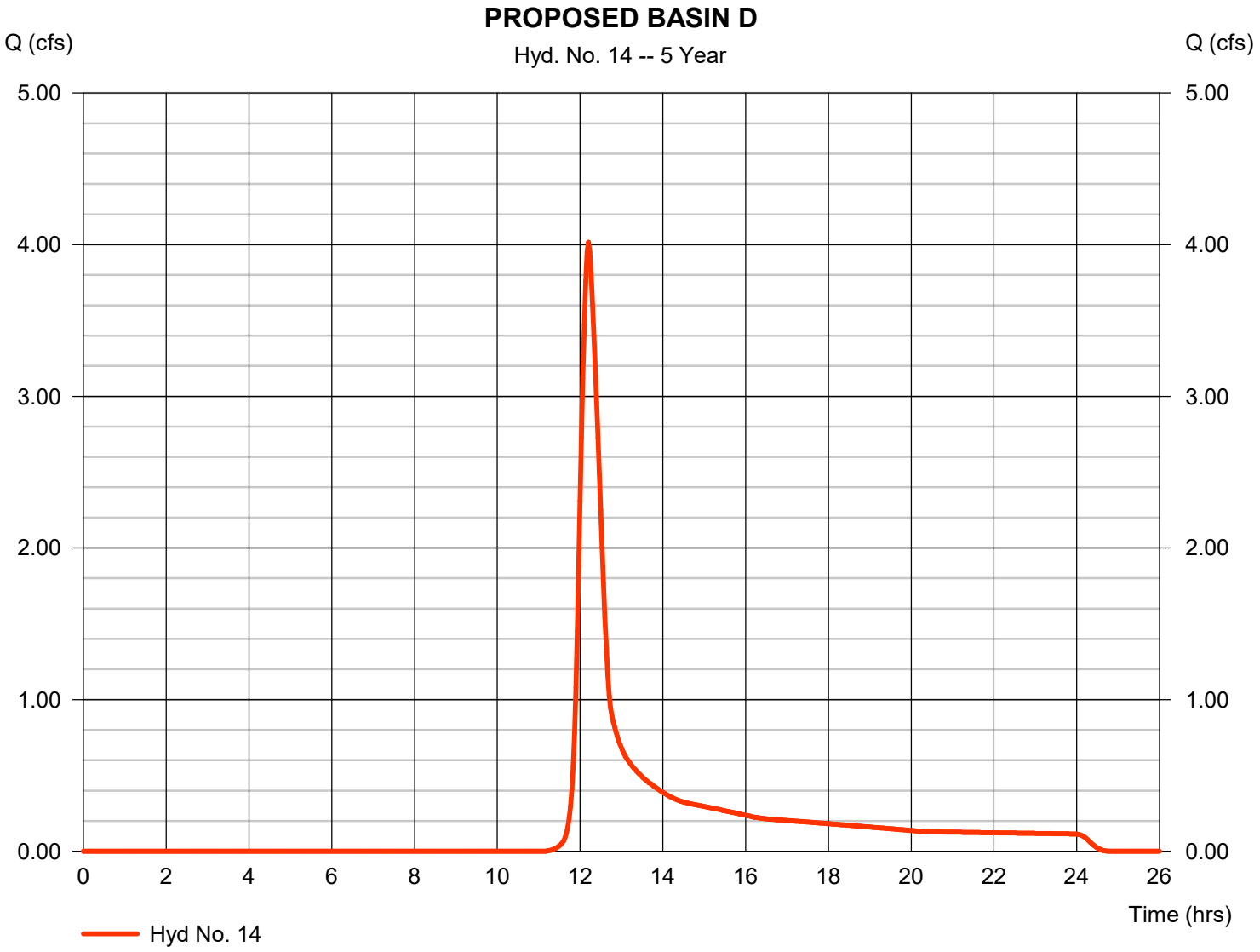


Hydrograph Report

Hyd. No. 14

PROPOSED BASIN D

Hydrograph type	= SCS Runoff	Peak discharge	= 4.016 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 17,454 cuft
Drainage area	= 4.200 ac	Curve number	= 69
Basin Slope	= 2.4 %	Hydraulic length	= 970 ft
Tc method	= LAG	Time of conc. (Tc)	= 27.60 min
Total precip.	= 3.81 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

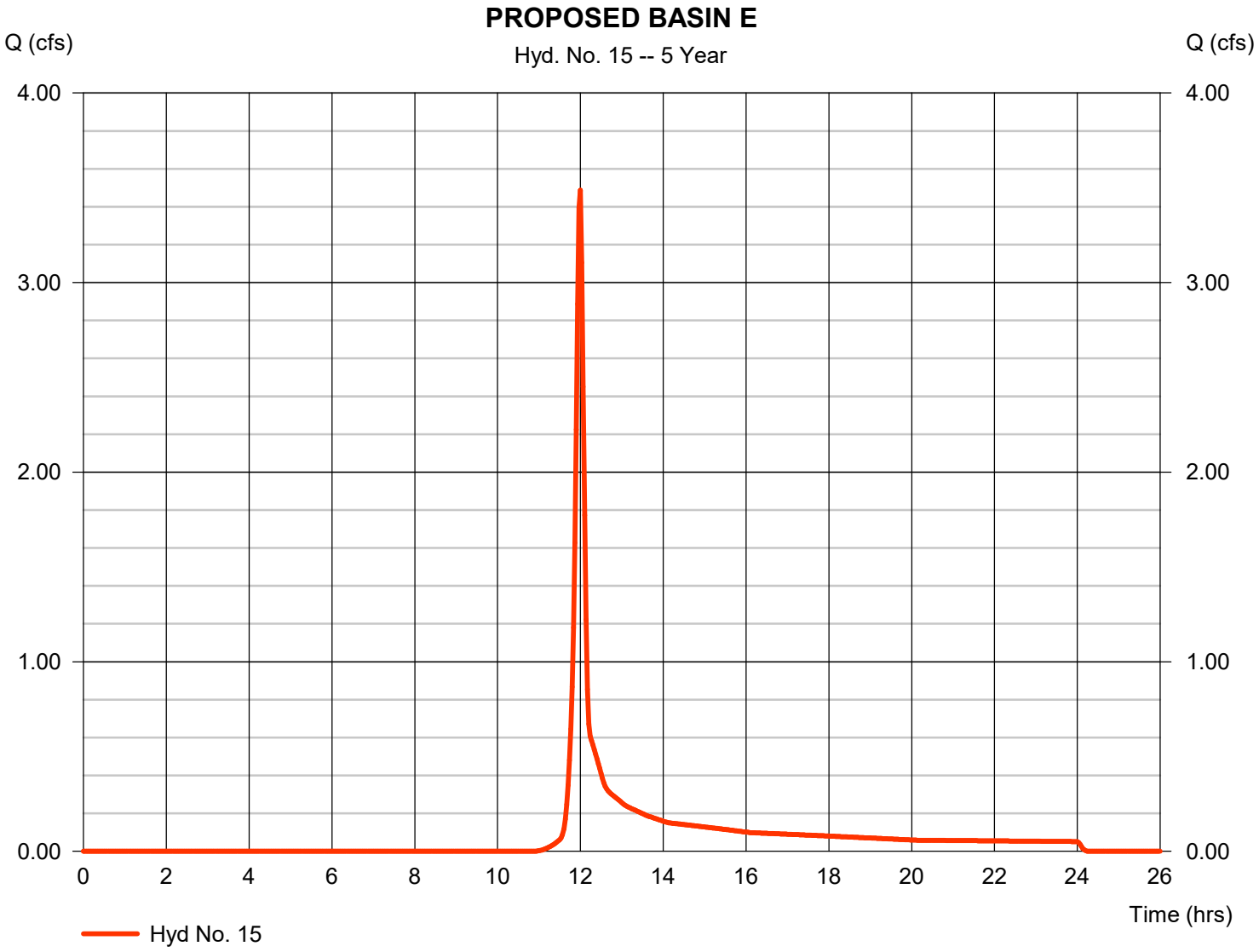


Hydrograph Report

Hyd. No. 15

PROPOSED BASIN E

Hydrograph type	= SCS Runoff	Peak discharge	= 3.487 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 8,089 cuft
Drainage area	= 1.850 ac	Curve number	= 70
Basin Slope	= 2.1 %	Hydraulic length	= 175 ft
Tc method	= LAG	Time of conc. (Tc)	= 7.20 min
Total precip.	= 3.81 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



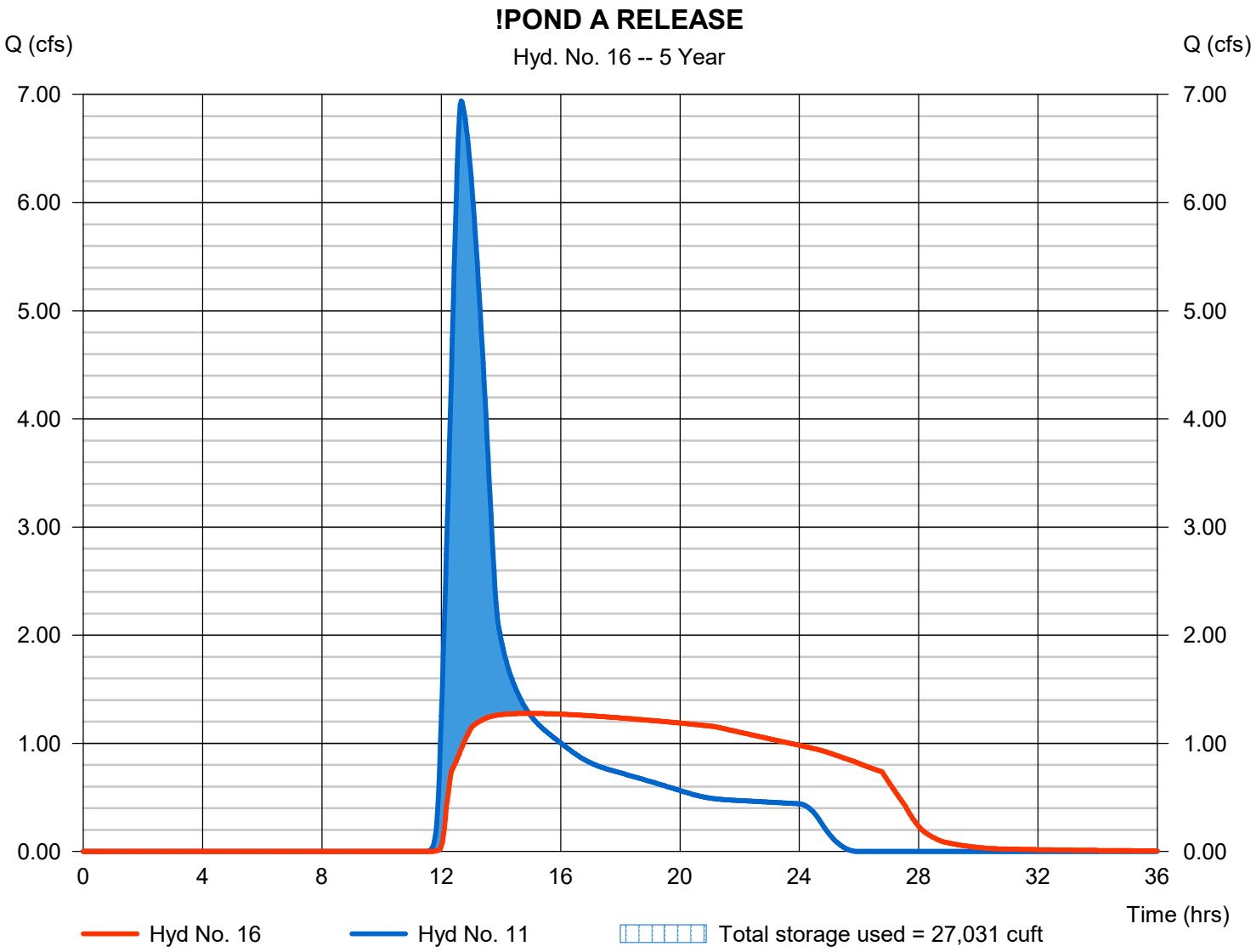
Hydrograph Report

Hyd. No. 16

!POND A RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	1.276 cfs
Storm frequency	=	5 yrs	Time to peak	=	14.93 hrs
Time interval	=	2 min	Hyd. volume	=	61,728 cuft
Inflow hyd. No.	=	11 - PROPOSED BASIN A	Max. Elevation	=	933.36 ft
Reservoir name	=	POND A	Max. Storage	=	27,031 cuft

Storage Indication method used.

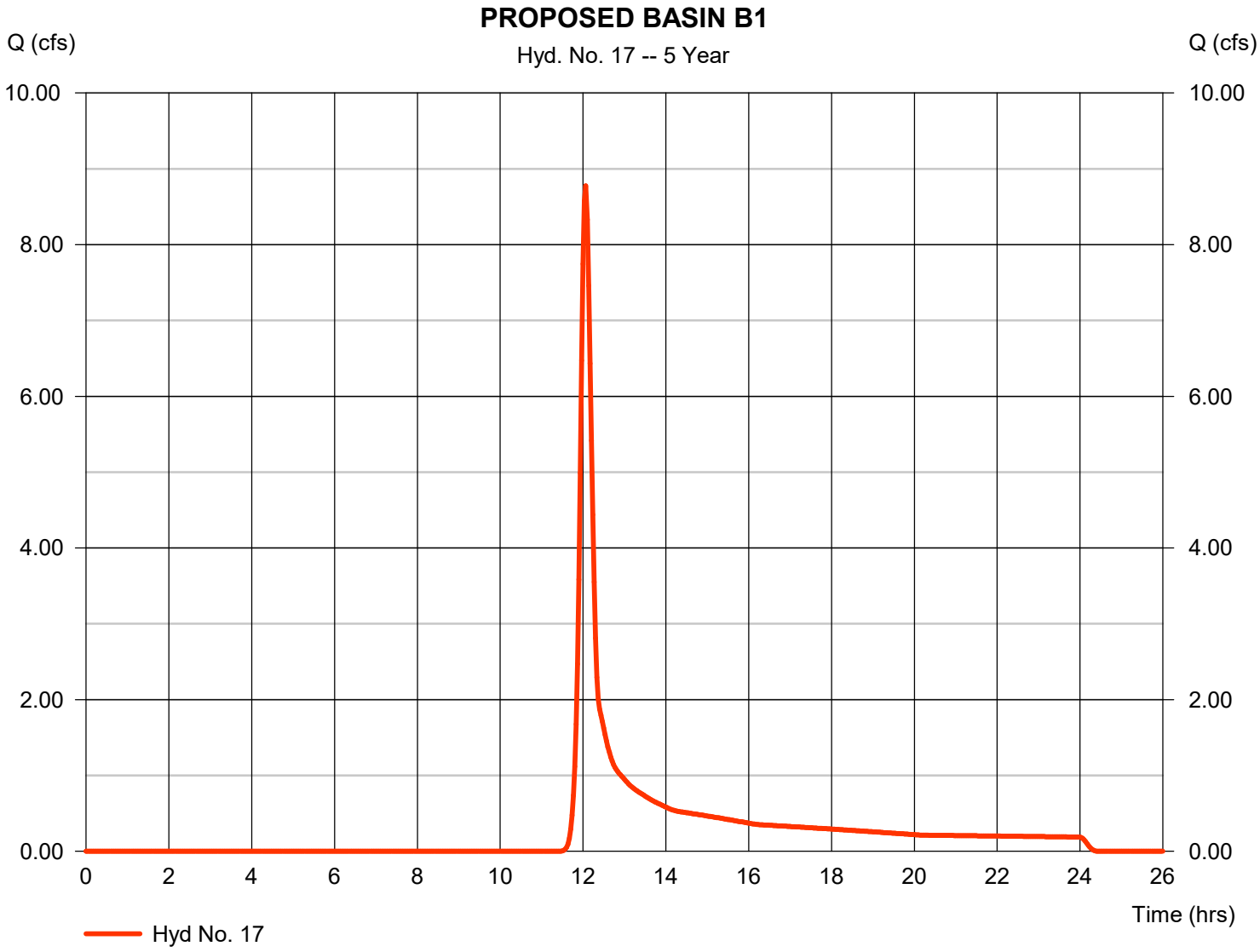


Hydrograph Report

Hyd. No. 17

PROPOSED BASIN B1

Hydrograph type	= SCS Runoff	Peak discharge	= 8.777 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 26,894 cuft
Drainage area	= 7.800 ac	Curve number	= 66
Basin Slope	= 6.5 %	Hydraulic length	= 760 ft
Tc method	= LAG	Time of conc. (Tc)	= 14.80 min
Total precip.	= 3.81 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

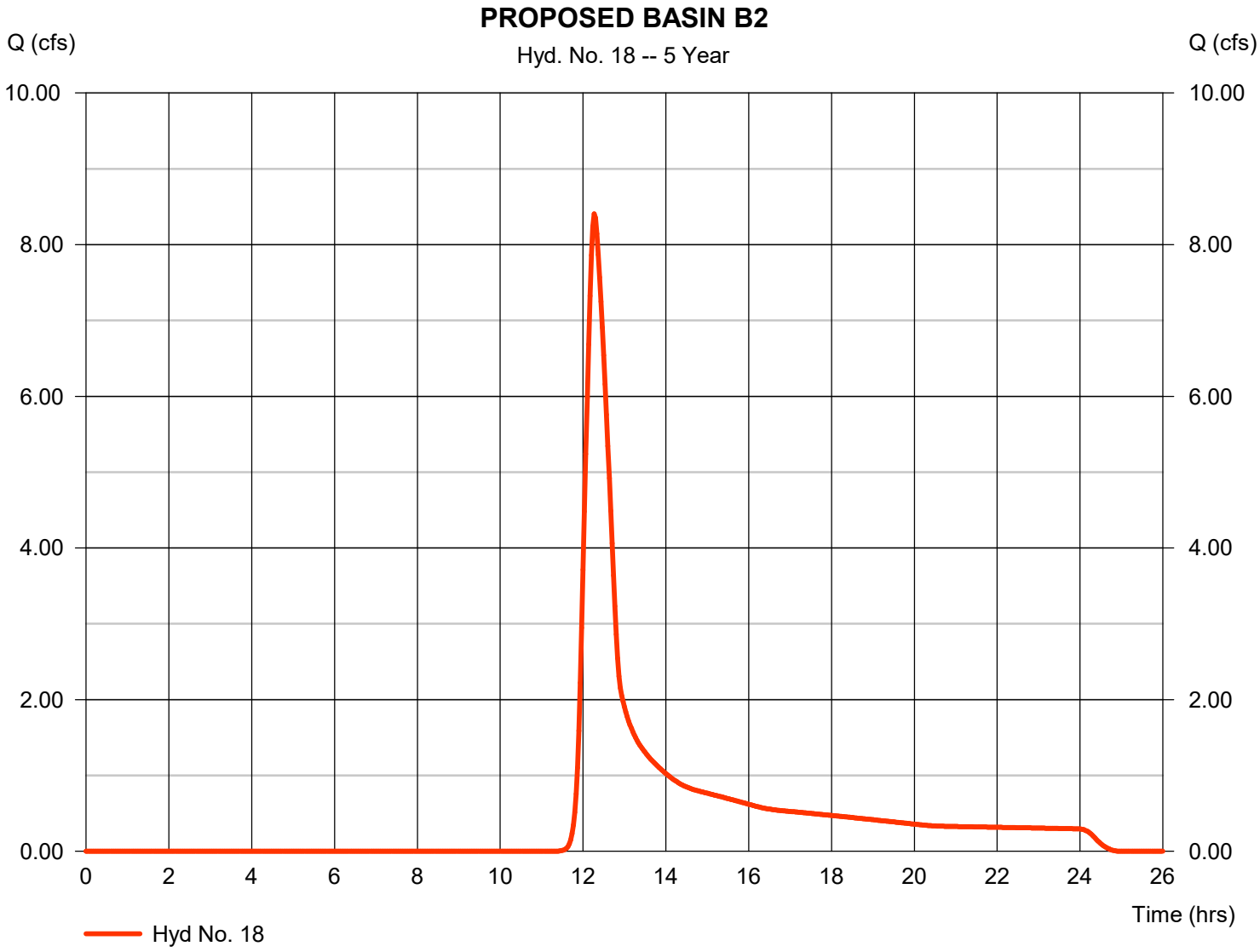


Hydrograph Report

Hyd. No. 18

PROPOSED BASIN B2

Hydrograph type	= SCS Runoff	Peak discharge	= 8.407 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 43,086 cuft
Drainage area	= 11.660 ac	Curve number	= 67
Basin Slope	= 3.5 %	Hydraulic length	= 1500 ft
Tc method	= LAG	Time of conc. (Tc)	= 34.00 min
Total precip.	= 3.81 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

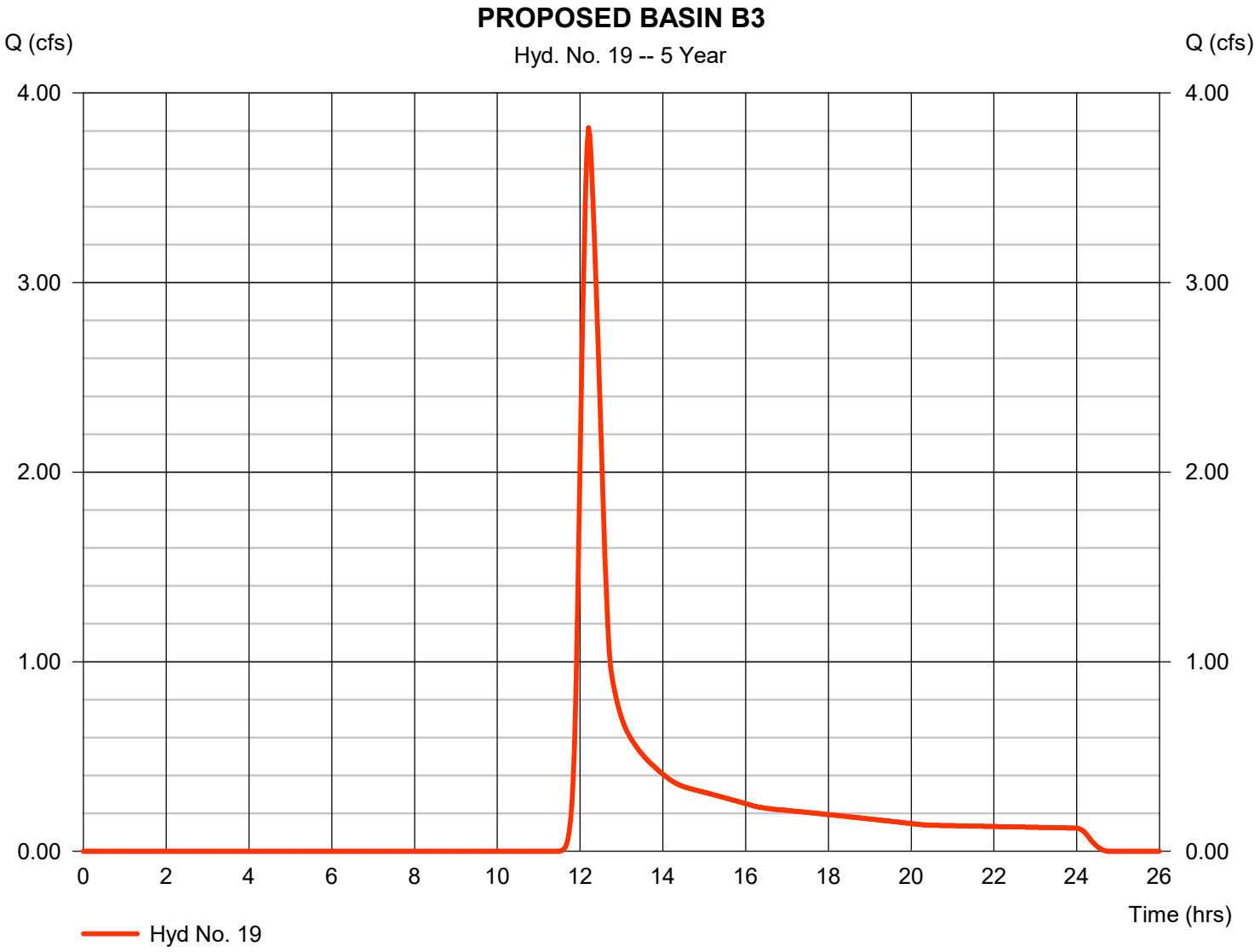


Hydrograph Report

Hyd. No. 19

PROPOSED BASIN B3

Hydrograph type	= SCS Runoff	Peak discharge	= 3.817 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 17,434 cuft
Drainage area	= 4.930 ac	Curve number	= 66
Basin Slope	= 2.7 %	Hydraulic length	= 950 ft
Tc method	= LAG	Time of conc. (Tc)	= 27.30 min
Total precip.	= 3.81 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

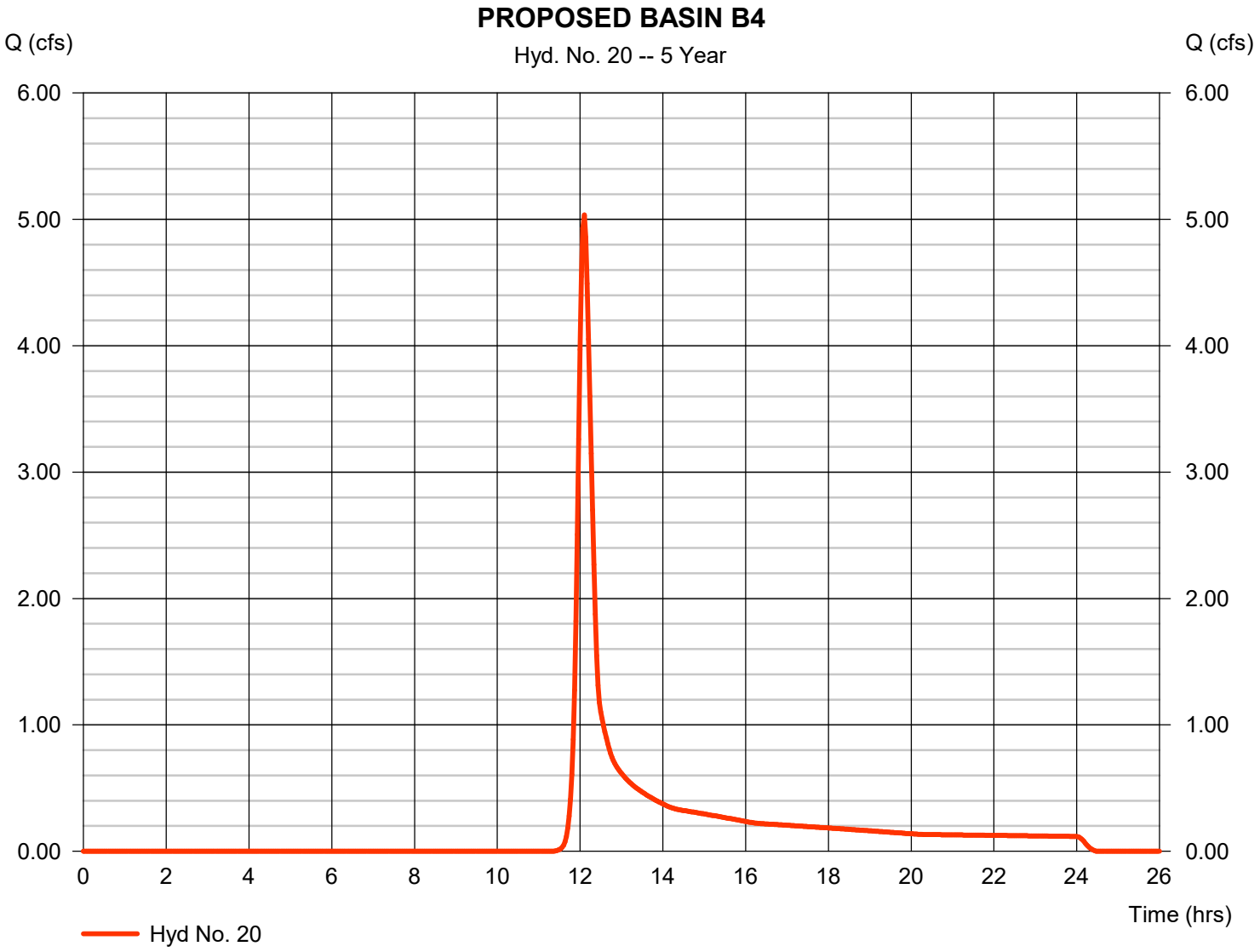


Hydrograph Report

Hyd. No. 20

PROPOSED BASIN B4

Hydrograph type	= SCS Runoff	Peak discharge	= 5.035 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 17,231 cuft
Drainage area	= 4.610 ac	Curve number	= 67
Basin Slope	= 4.1 %	Hydraulic length	= 780 ft
Tc method	= LAG	Time of conc. (Tc)	= 18.60 min
Total precip.	= 3.81 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

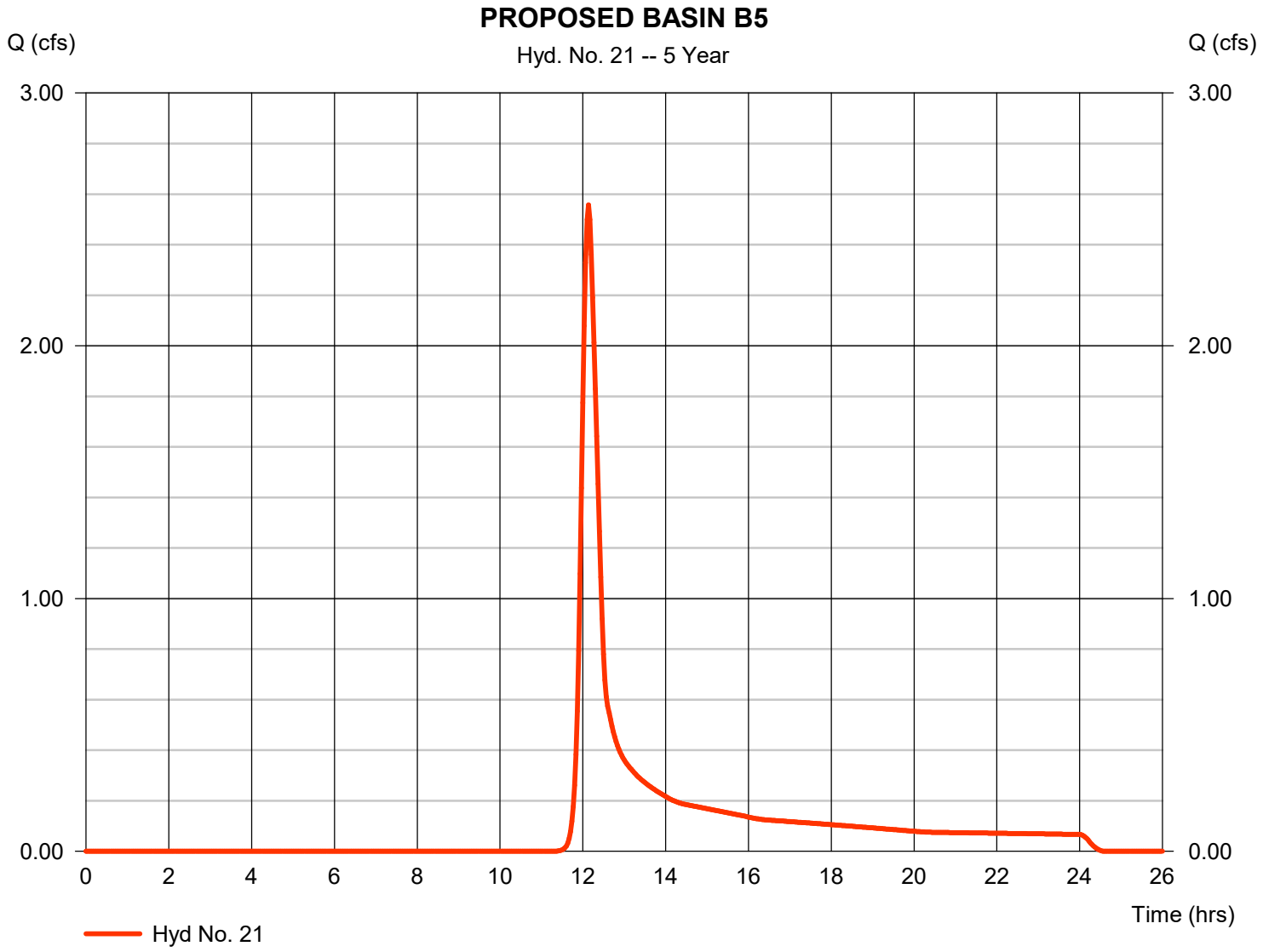


Hydrograph Report

Hyd. No. 21

PROPOSED BASIN B5

Hydrograph type	= SCS Runoff	Peak discharge	= 2.557 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 9,777 cuft
Drainage area	= 2.570 ac	Curve number	= 67
Basin Slope	= 2.5 %	Hydraulic length	= 750 ft
Tc method	= LAG	Time of conc. (Tc)	= 23.10 min
Total precip.	= 3.81 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

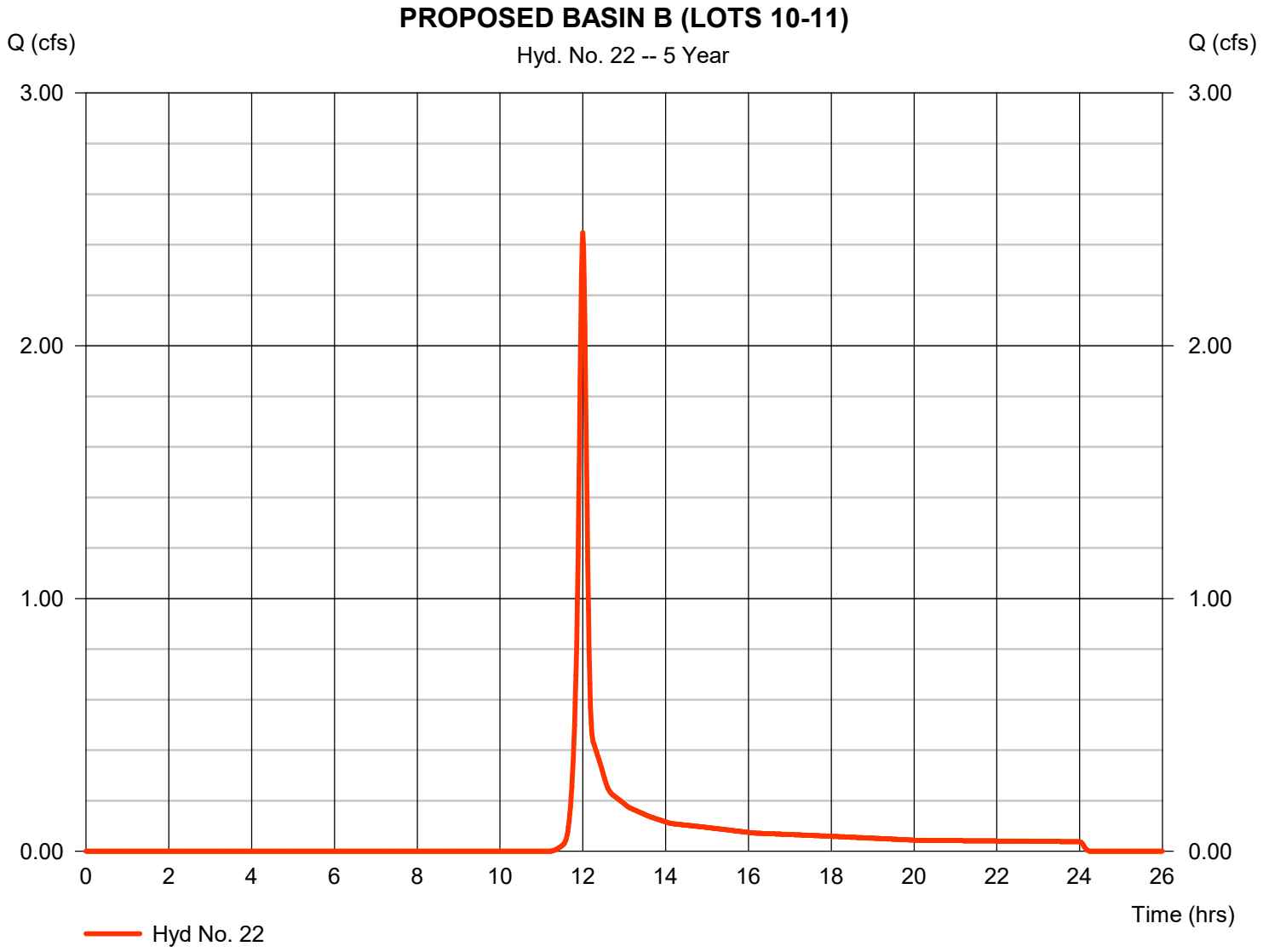


Hydrograph Report

Hyd. No. 22

PROPOSED BASIN B (LOTS 10-11)

Hydrograph type	= SCS Runoff	Peak discharge	= 2.448 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 5,719 cuft
Drainage area	= 1.450 ac	Curve number	= 68
Basin Slope	= 2.0 %	Hydraulic length	= 100 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.81 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

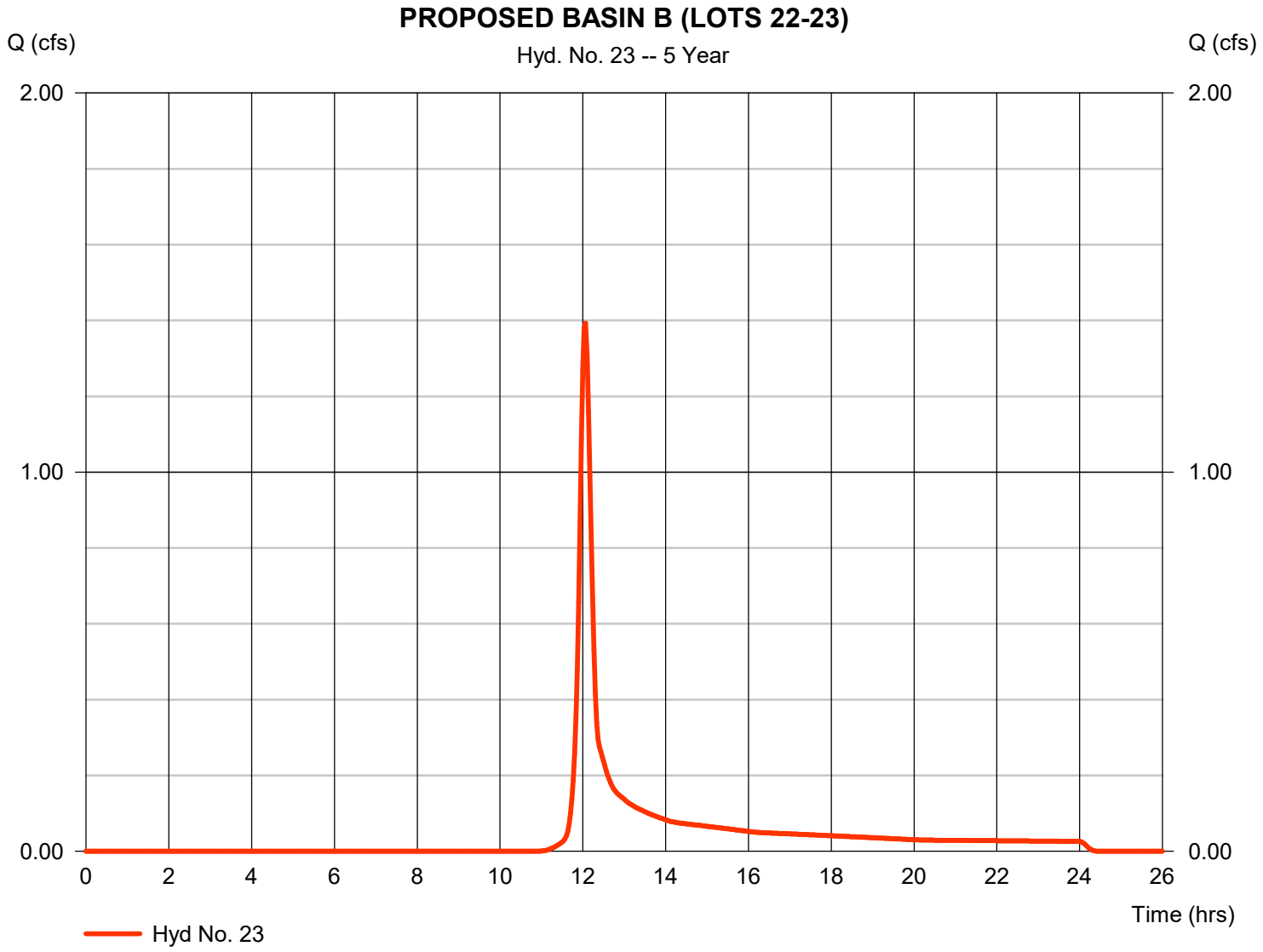


Hydrograph Report

Hyd. No. 23

PROPOSED BASIN B (LOTS 22-23)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.393 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 4,093 cuft
Drainage area	= 0.960 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.81 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

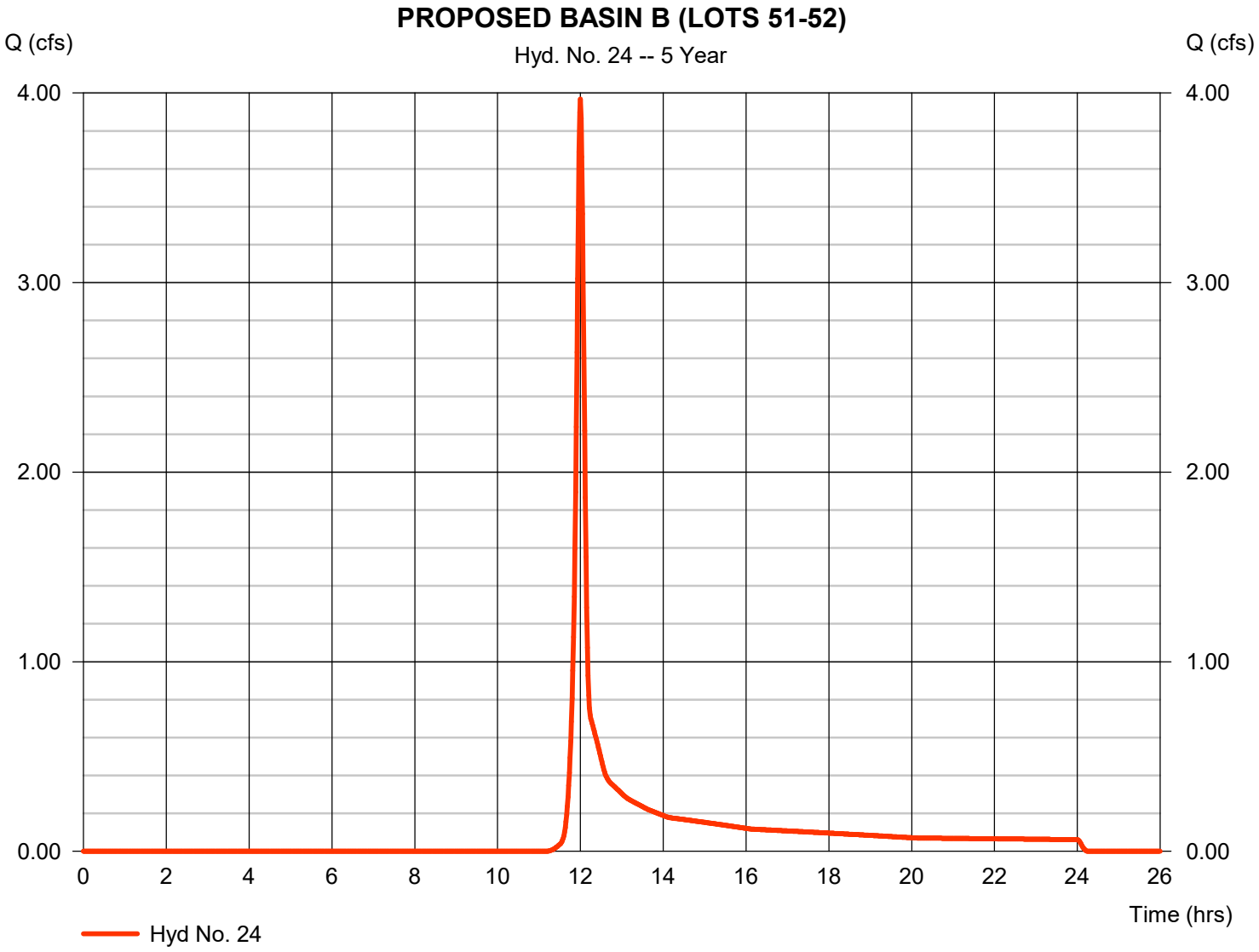


Hydrograph Report

Hyd. No. 24

PROPOSED BASIN B (LOTS 51-52)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.967 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 9,269 cuft
Drainage area	= 2.350 ac	Curve number	= 68
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.81 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

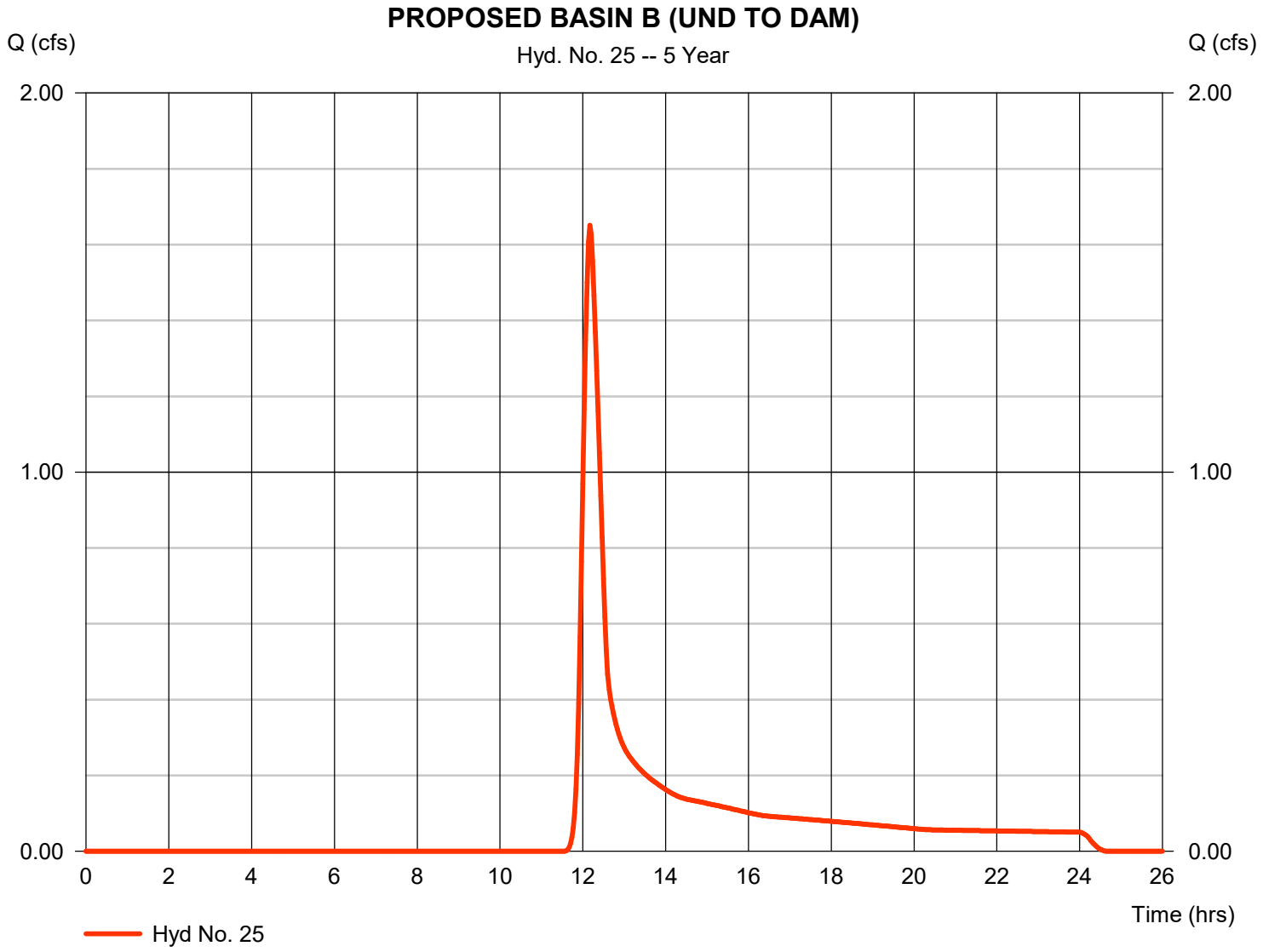


Hydrograph Report

Hyd. No. 25

PROPOSED BASIN B (UND TO DAM)

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.651 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	7,004 cuft
Drainage area	=	2.130 ac	Curve number	=	65
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	25.00 min
Total precip.	=	3.81 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



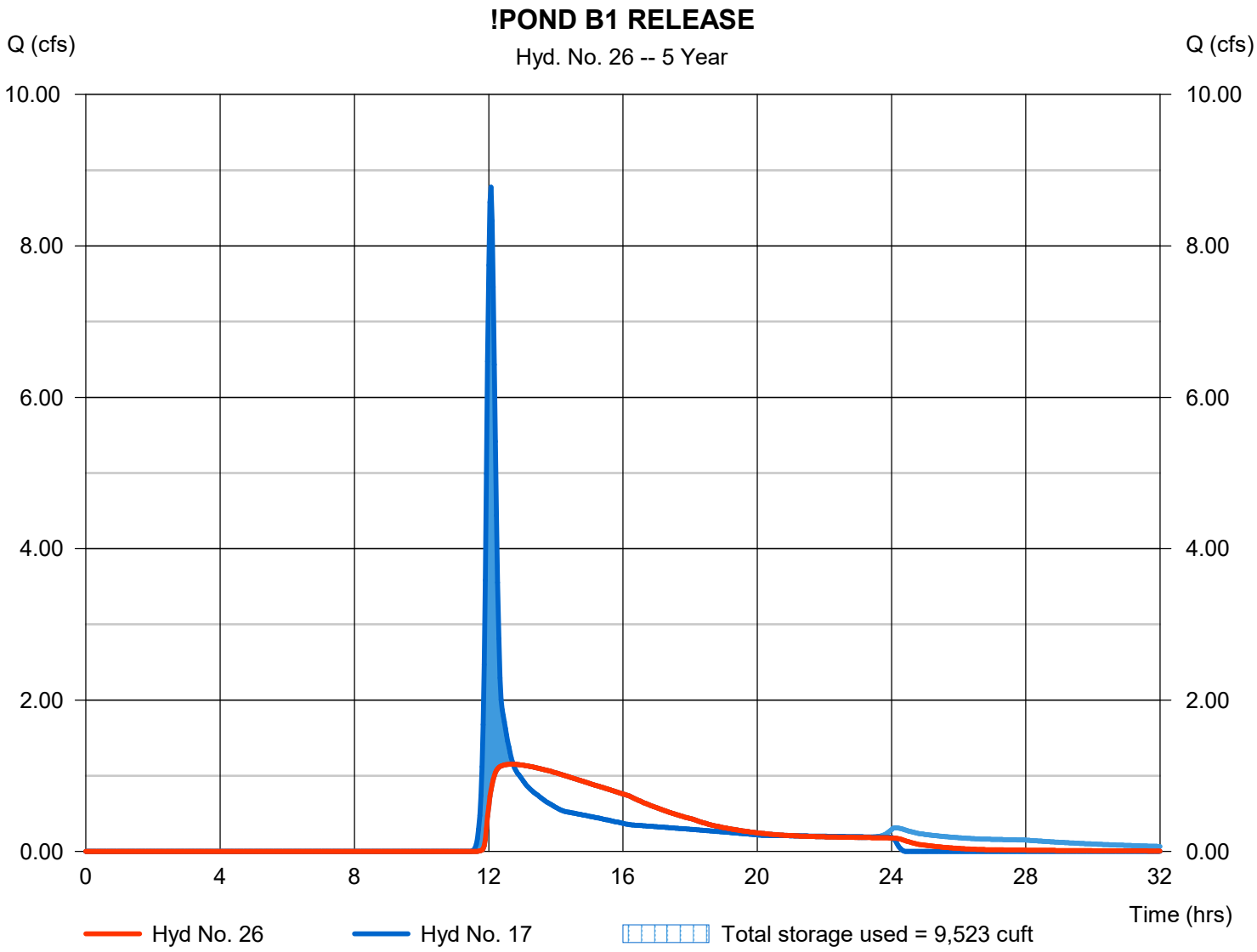
Hydrograph Report

Hyd. No. 26

!POND B1 RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	1.153 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.67 hrs
Time interval	=	2 min	Hyd. volume	=	24,953 cuft
Inflow hyd. No.	=	17 - PROPOSED BASIN B1	Max. Elevation	=	935.99 ft
Reservoir name	=	POND B1	Max. Storage	=	9,523 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



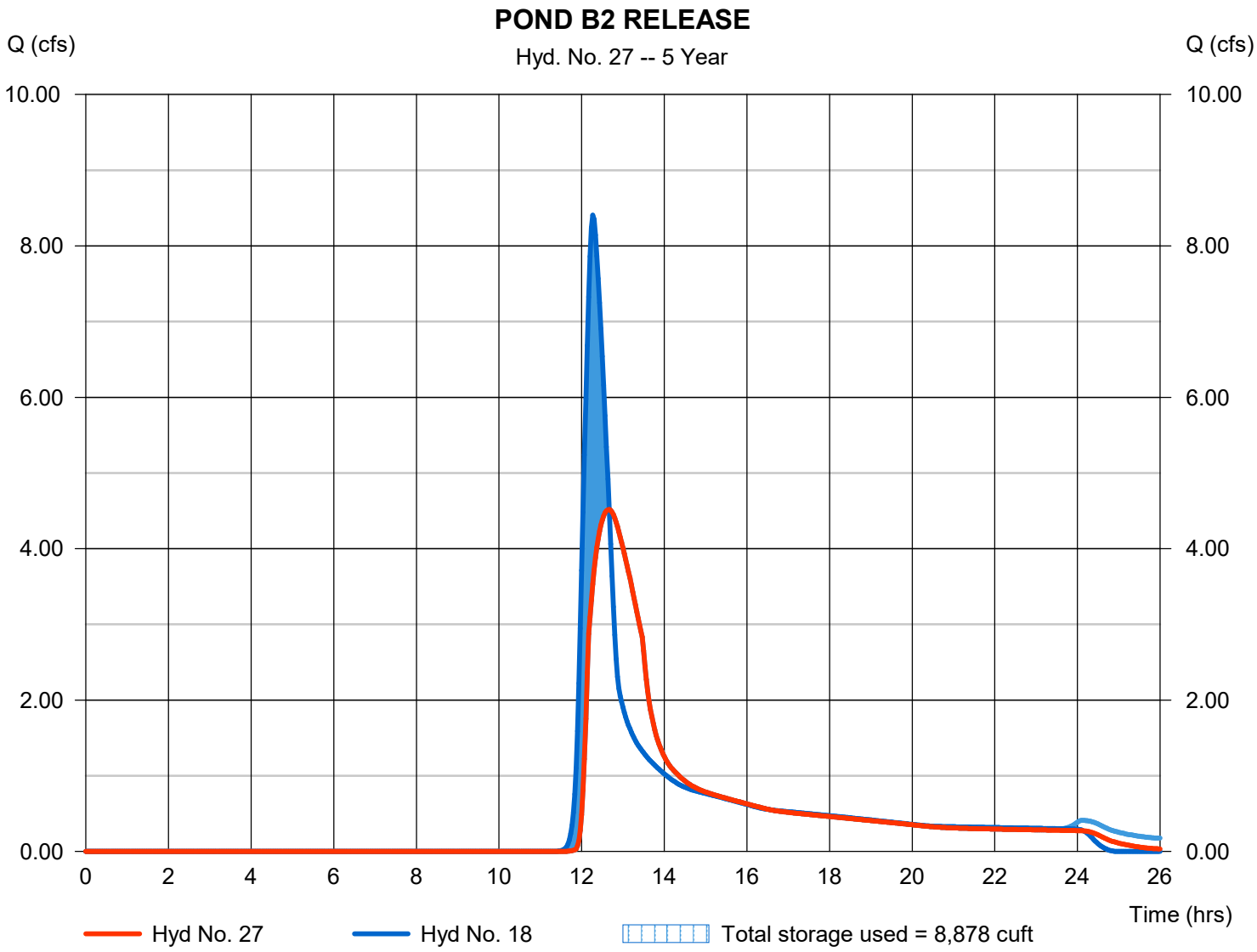
Hydrograph Report

Hyd. No. 27

POND B2 RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	4.517 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.67 hrs
Time interval	=	2 min	Hyd. volume	=	40,934 cuft
Inflow hyd. No.	=	18 - PROPOSED BASIN B2	Max. Elevation	=	939.49 ft
Reservoir name	=	POND B2	Max. Storage	=	8,878 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

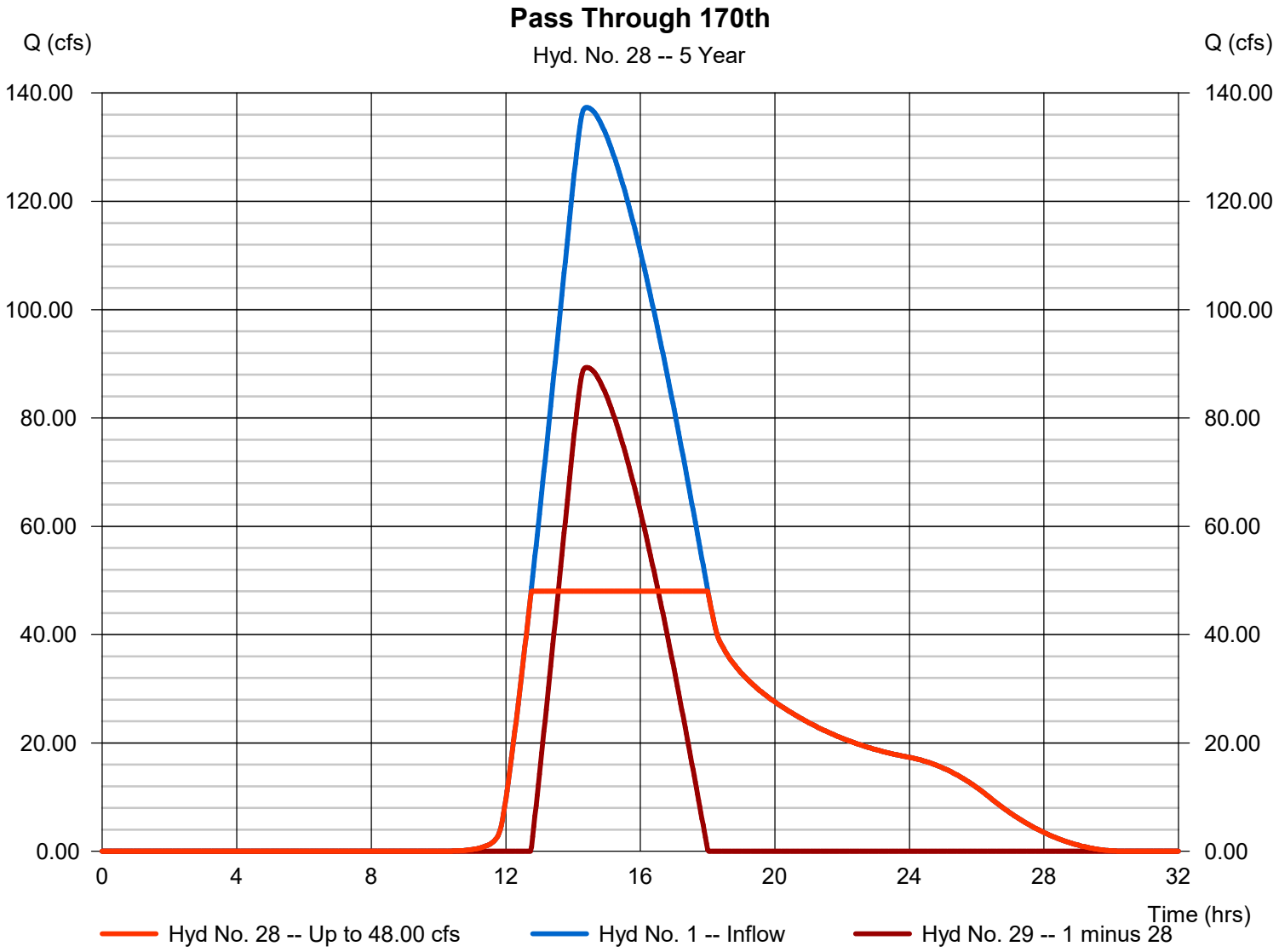


Hydrograph Report

Hyd. No. 28

Pass Through 170th

Hydrograph type	= Diversion1	Peak discharge	= 48.00 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.77 hrs
Time interval	= 2 min	Hyd. volume	= 1,715,593 cuft
Inflow hydrograph	= 1 - Off-Site Basin B (upper)	2nd diverted hyd.	= 29
Diversion method	= Constant Q	Constant Q	= 48.00 cfs

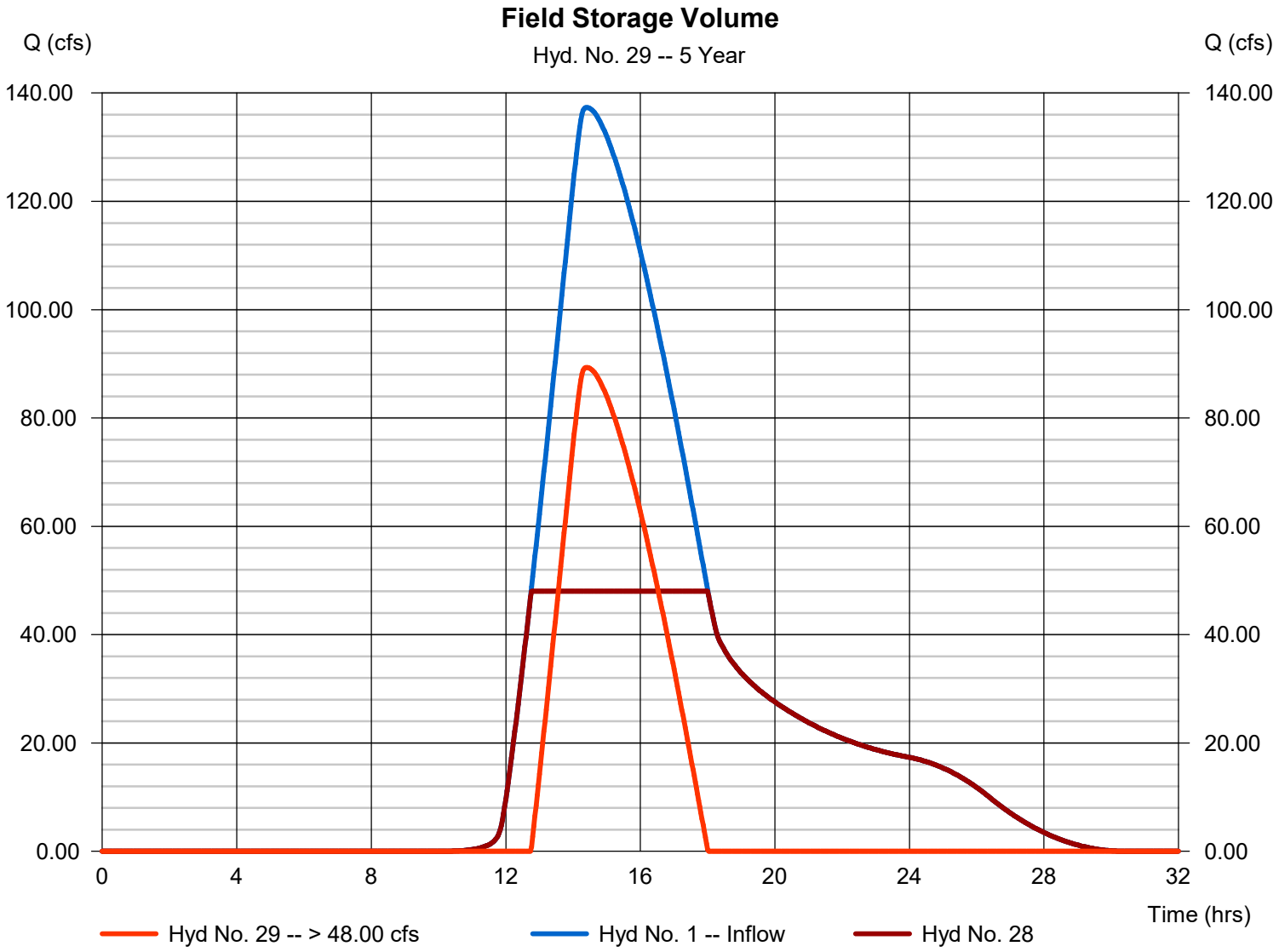


Hydrograph Report

Hyd. No. 29

Field Storage Volume

Hydrograph type	= Diversion2	Peak discharge	= 89.32 cfs
Storm frequency	= 5 yrs	Time to peak	= 14.40 hrs
Time interval	= 2 min	Hyd. volume	= 981,361 cuft
Inflow hydrograph	= 1 - Off-Site Basin B (upper)	2nd diverted hyd.	= 28
Diversion method	= Constant Q	Constant Q	= 48.00 cfs



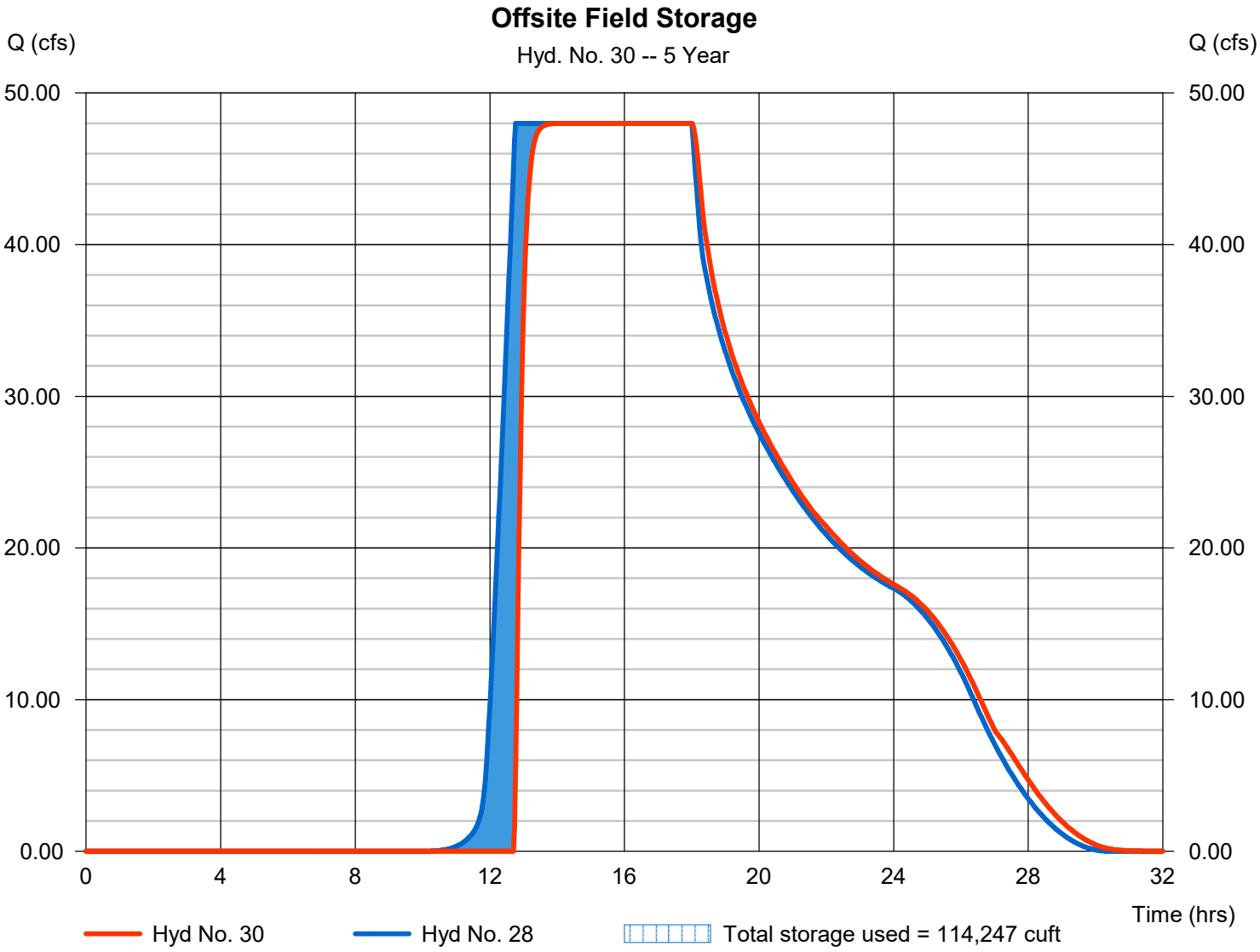
Hydrograph Report

Hyd. No. 30

Offsite Field Storage

Hydrograph type	=	Reservoir	Peak discharge	=	48.00 cfs
Storm frequency	=	5 yrs	Time to peak	=	14.73 hrs
Time interval	=	2 min	Hyd. volume	=	1,637,068 cuft
Inflow hyd. No.	=	28 - Pass Through 170th	Max. Elevation	=	957.83 ft
Reservoir name	=	Offsite Field Storage UPPER	Max. Storage	=	114,247 cuft

Storage Indication method used.

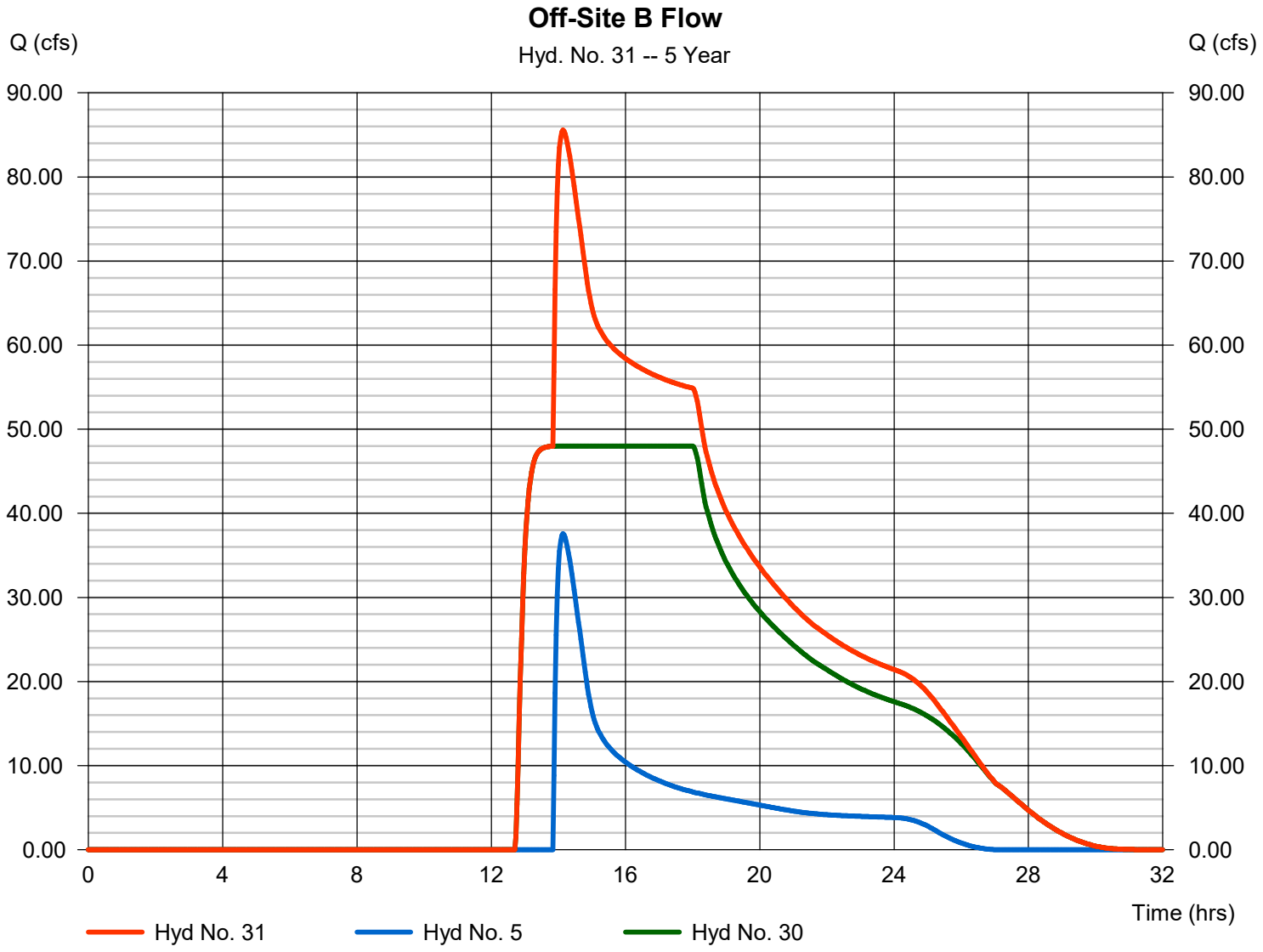


Hydrograph Report

Hyd. No. 31

Off-Site B Flow

Hydrograph type	= Combine	Peak discharge	= 85.57 cfs
Storm frequency	= 5 yrs	Time to peak	= 14.13 hrs
Time interval	= 2 min	Hyd. volume	= 1,983,995 cuft
Inflow hyds.	= 5, 30	Contrib. drain. area	= 0.000 ac



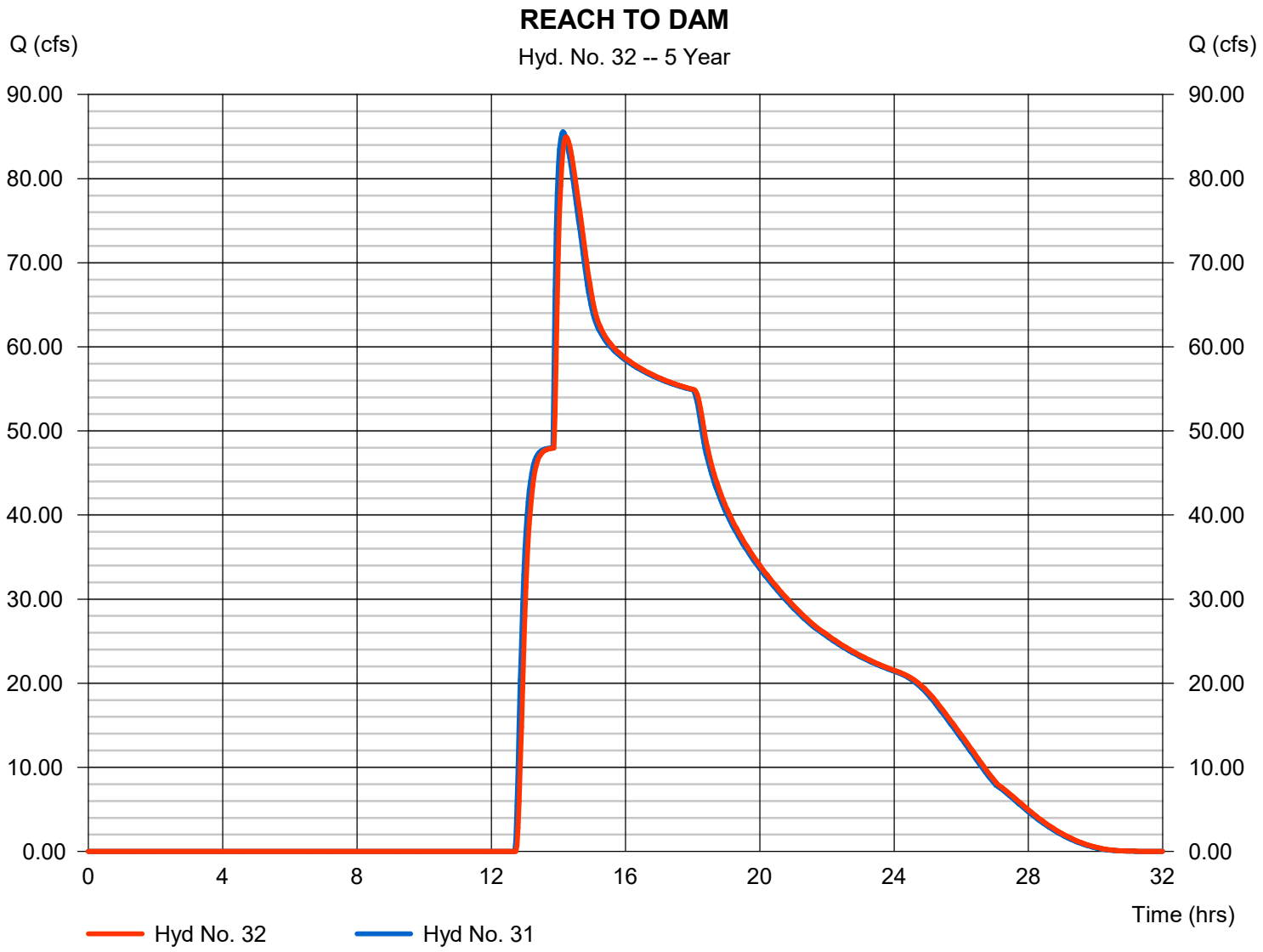
Hydrograph Report

Hyd. No. 32

REACH TO DAM

Hydrograph type	=	Reach	Peak discharge	=	84.97 cfs
Storm frequency	=	5 yrs	Time to peak	=	14.23 hrs
Time interval	=	2 min	Hyd. volume	=	1,983,983 cuft
Inflow hyd. No.	=	31 - Off-Site B Flow	Section type	=	Trapezoidal
Reach length	=	1000.0 ft	Channel slope	=	1.0 %
Manning's n	=	0.025	Bottom width	=	20.0 ft
Side slope	=	4.0:1	Max. depth	=	5.0 ft
Rating curve x	=	0.808	Rating curve m	=	1.438
Ave. velocity	=	3.34 ft/s	Routing coeff.	=	0.4474

Modified Att-Kin routing method used.



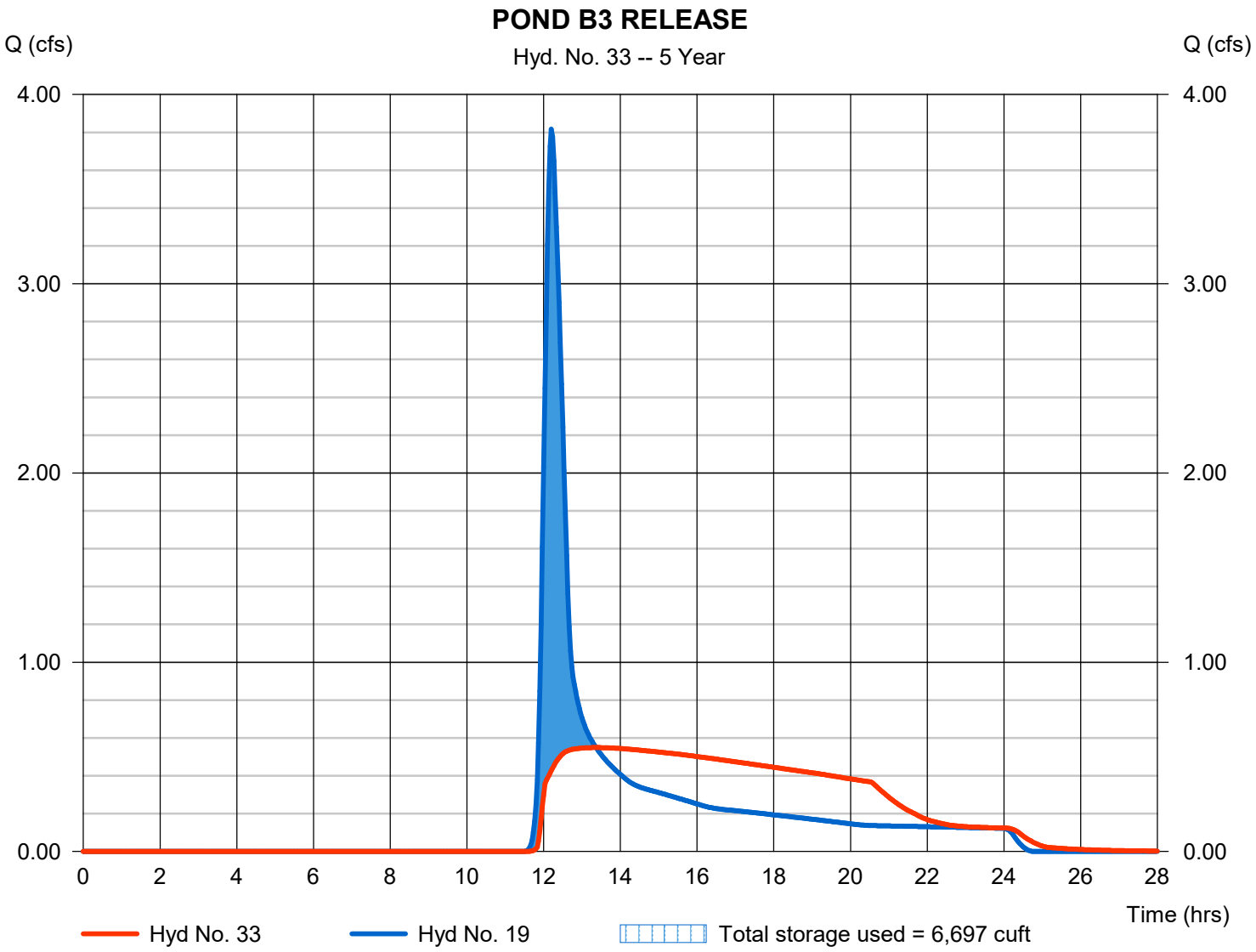
Hydrograph Report

Hyd. No. 33

POND B3 RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	0.549 cfs
Storm frequency	=	5 yrs	Time to peak	=	13.37 hrs
Time interval	=	2 min	Hyd. volume	=	17,430 cuft
Inflow hyd. No.	=	19 - PROPOSED BASIN B3	Max. Elevation	=	939.00 ft
Reservoir name	=	POND B3	Max. Storage	=	6,697 cuft

Storage Indication method used.

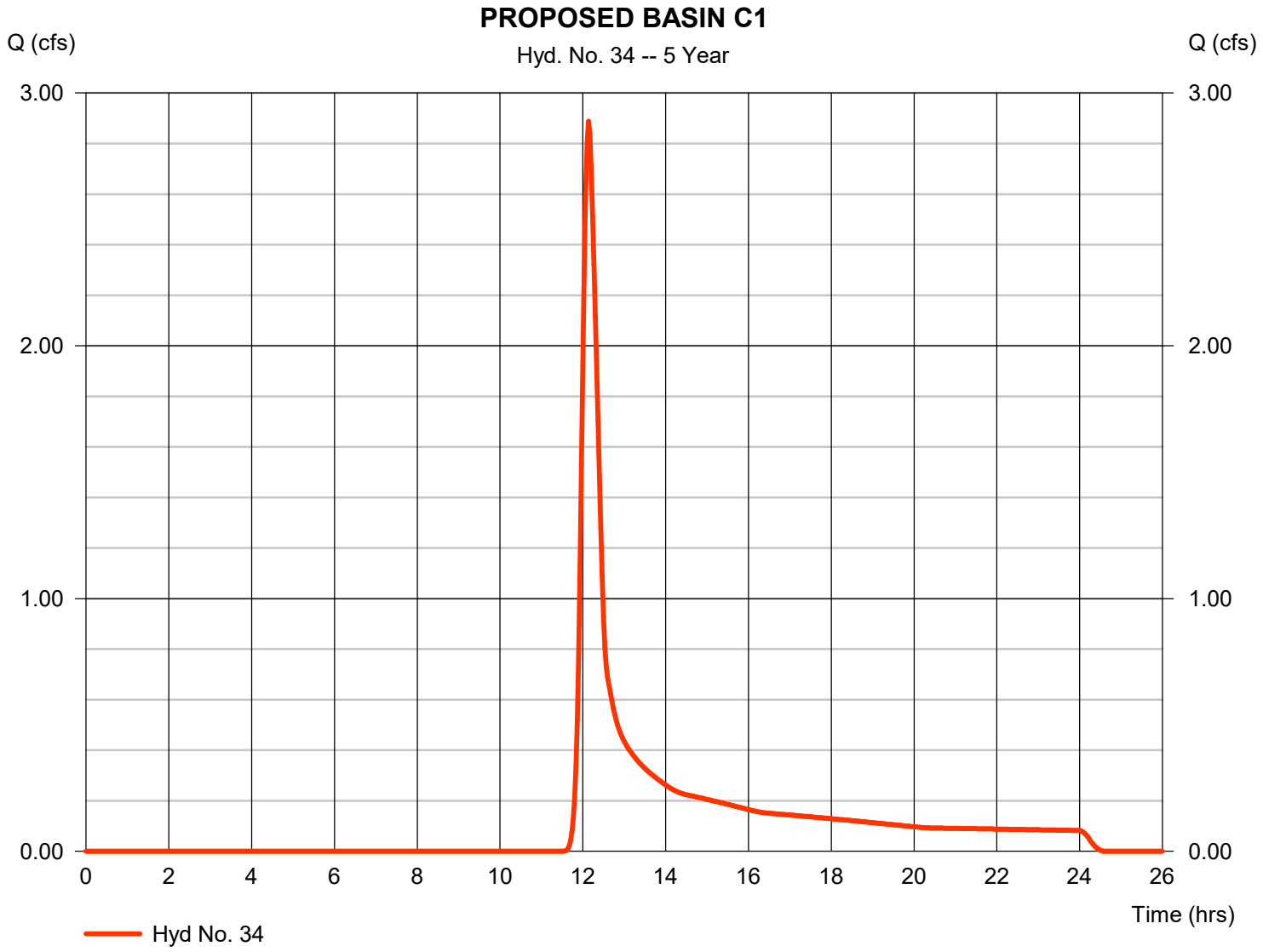


Hydrograph Report

Hyd. No. 34

PROPOSED BASIN C1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.888 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 11,458 cuft
Drainage area	= 3.370 ac	Curve number	= 65
Basin Slope	= 2.3 %	Hydraulic length	= 630 ft
Tc method	= LAG	Time of conc. (Tc)	= 22.00 min
Total precip.	= 3.81 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

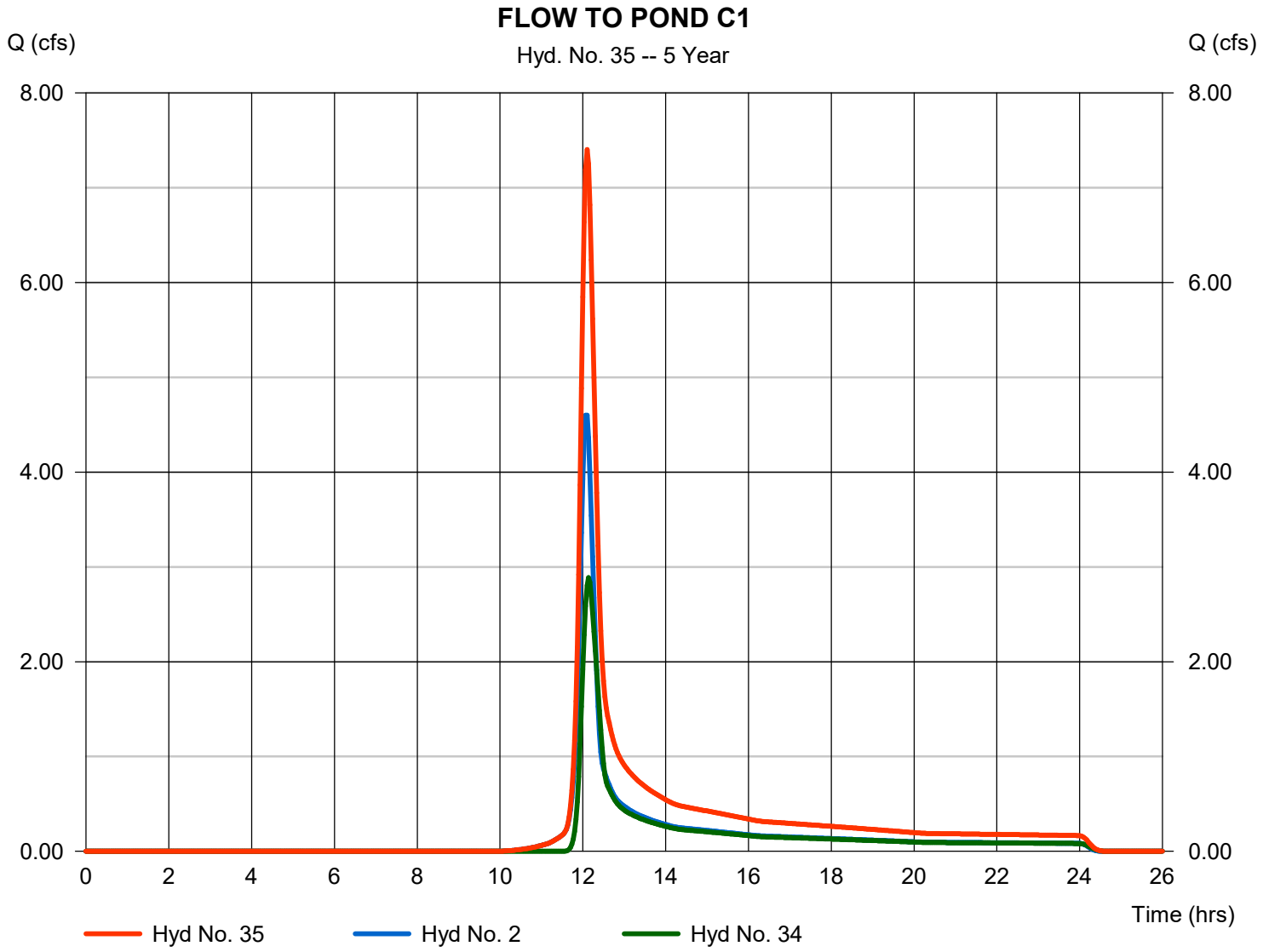


Hydrograph Report

Hyd. No. 35

FLOW TO POND C1

Hydrograph type	= Combine	Peak discharge	= 7.403 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 26,188 cuft
Inflow hyds.	= 2, 34	Contrib. drain. area	= 6.030 ac

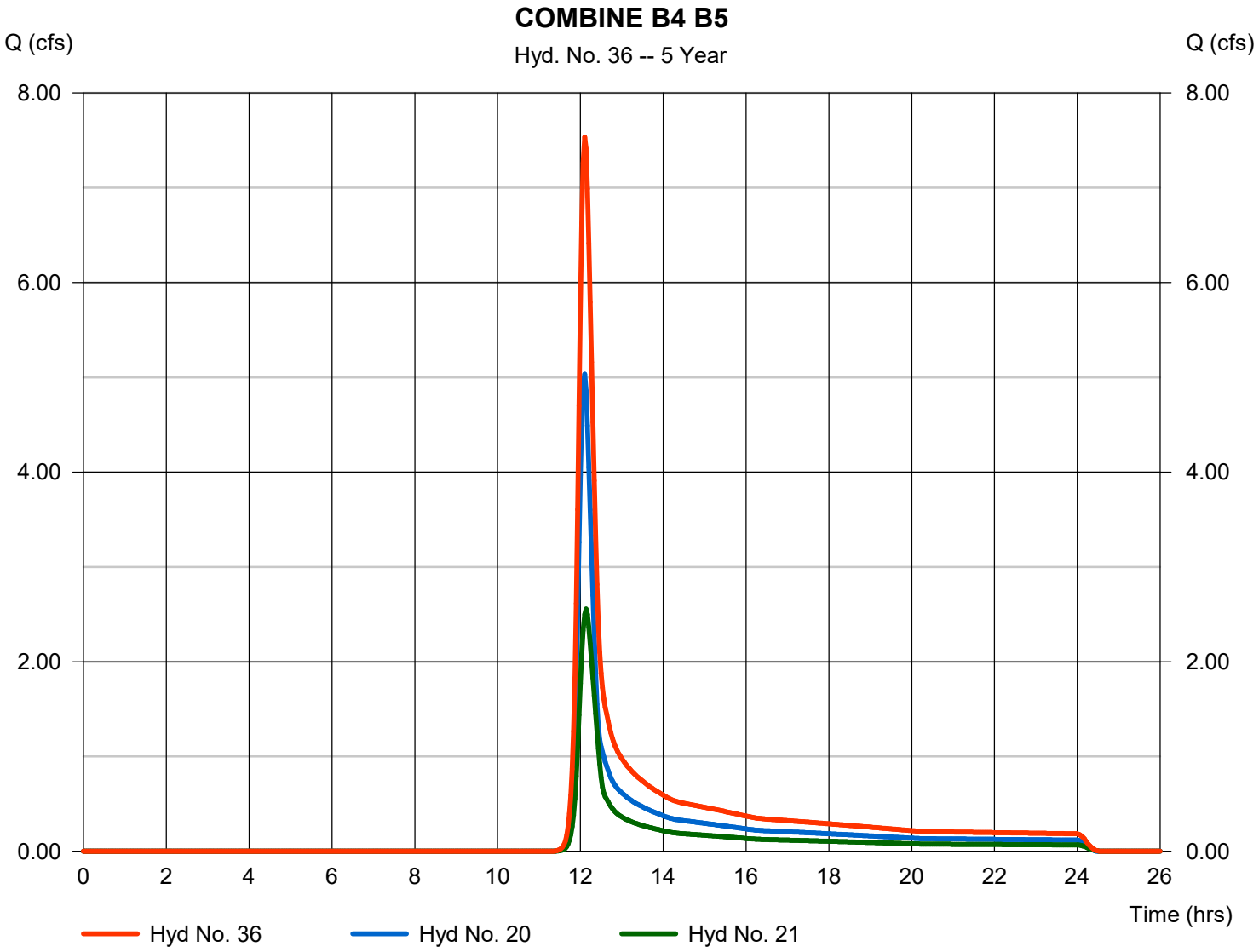


Hydrograph Report

Hyd. No. 36

COMBINE B4 B5

Hydrograph type	= Combine	Peak discharge	= 7.535 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 27,008 cuft
Inflow hyds.	= 20, 21	Contrib. drain. area	= 7.180 ac



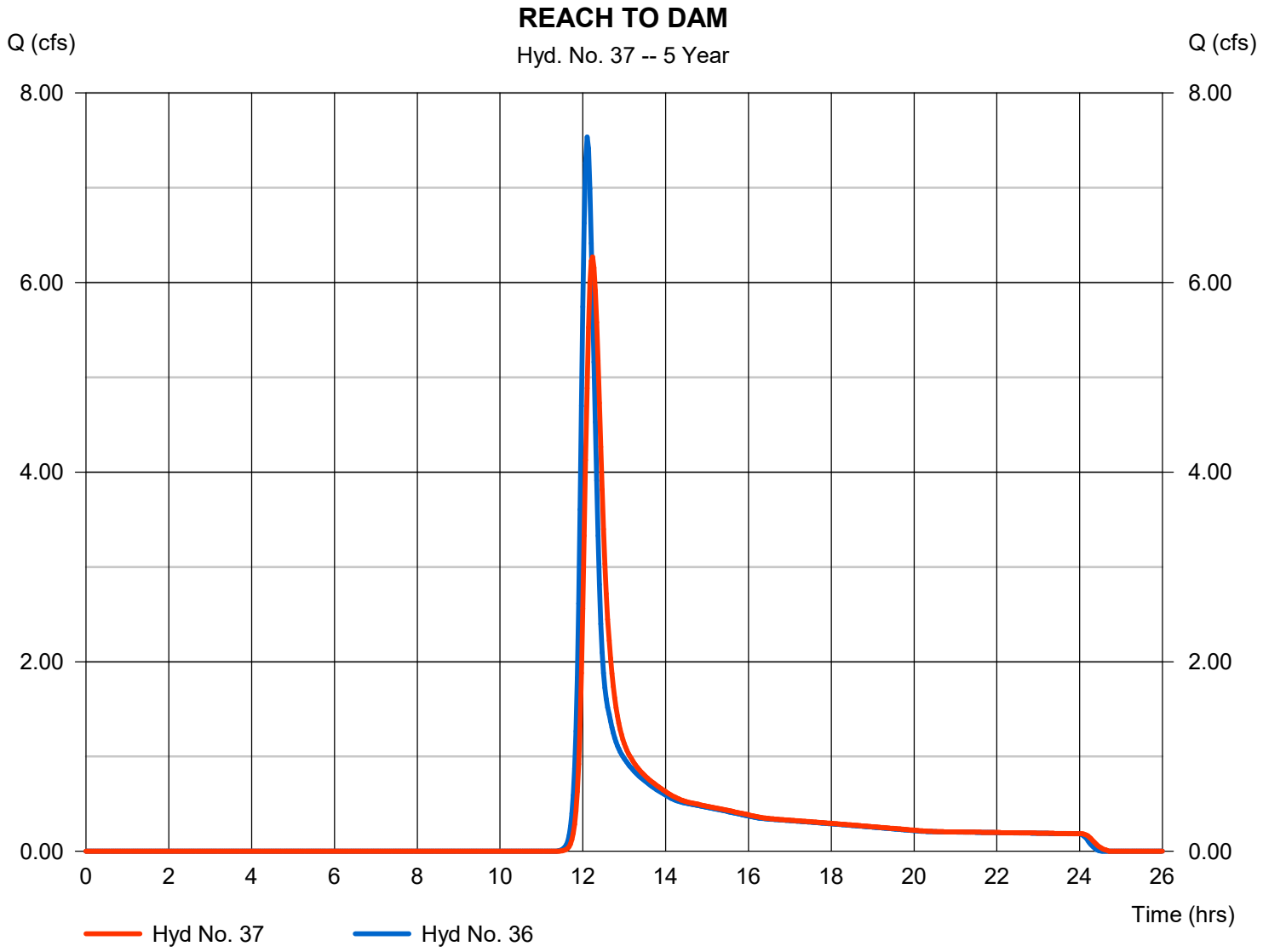
Hydrograph Report

Hyd. No. 37

REACH TO DAM

Hydrograph type	=	Reach	Peak discharge	=	6.271 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.23 hrs
Time interval	=	2 min	Hyd. volume	=	27,004 cuft
Inflow hyd. No.	=	36 - COMBINE B4 B5	Section type	=	Trapezoidal
Reach length	=	1000.0 ft	Channel slope	=	1.0 %
Manning's n	=	0.025	Bottom width	=	20.0 ft
Side slope	=	4.0:1	Max. depth	=	5.0 ft
Rating curve x	=	0.808	Rating curve m	=	1.438
Ave. velocity	=	1.59 ft/s	Routing coeff.	=	0.2418

Modified Att-Kin routing method used.

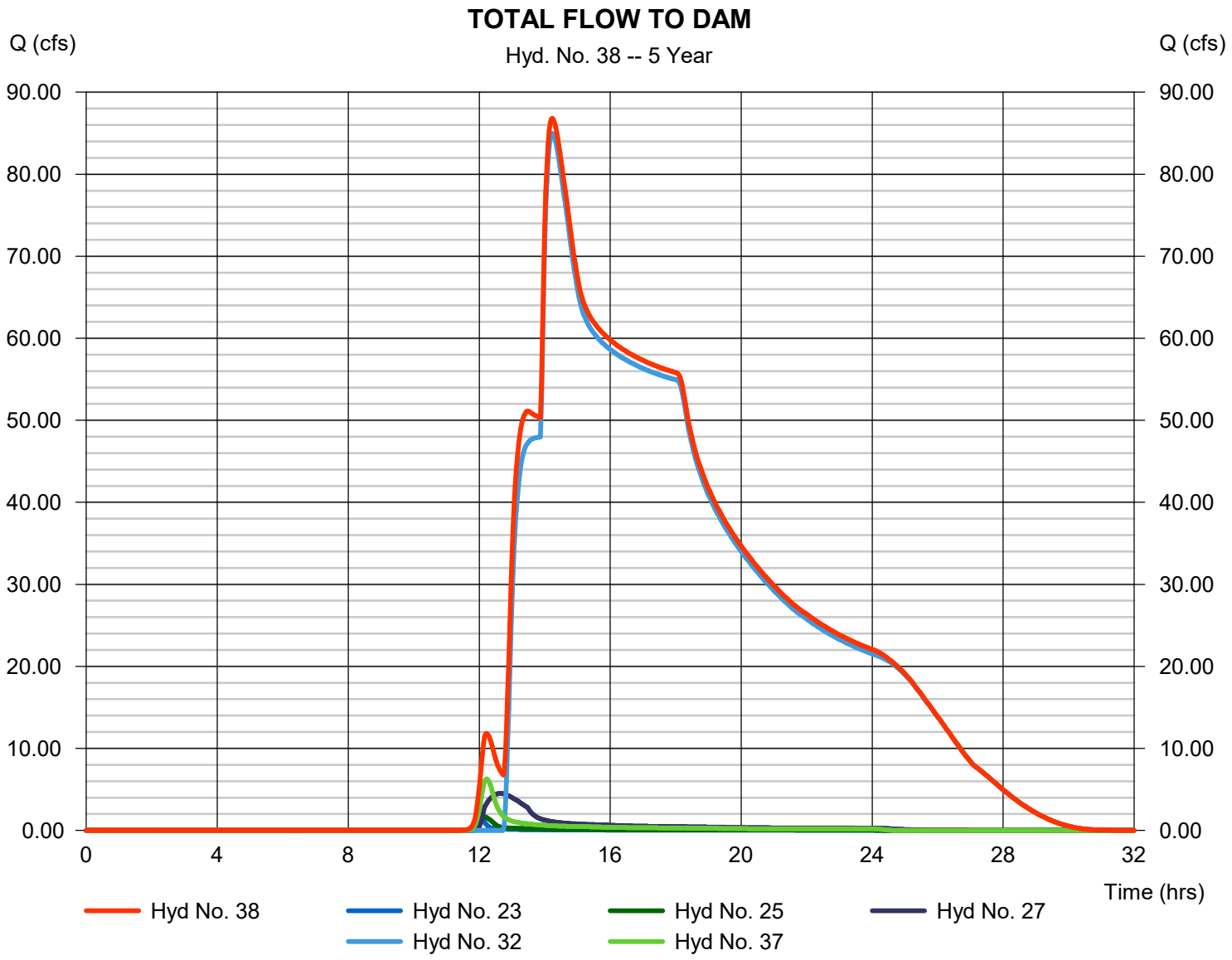


Hydrograph Report

Hyd. No. 38

TOTAL FLOW TO DAM

Hydrograph type	= Combine	Peak discharge	= 86.83 cfs
Storm frequency	= 5 yrs	Time to peak	= 14.23 hrs
Time interval	= 2 min	Hyd. volume	= 2,063,017 cuft
Inflow hyds.	= 23, 25, 27, 32, 37	Contrib. drain. area	= 3.090 ac



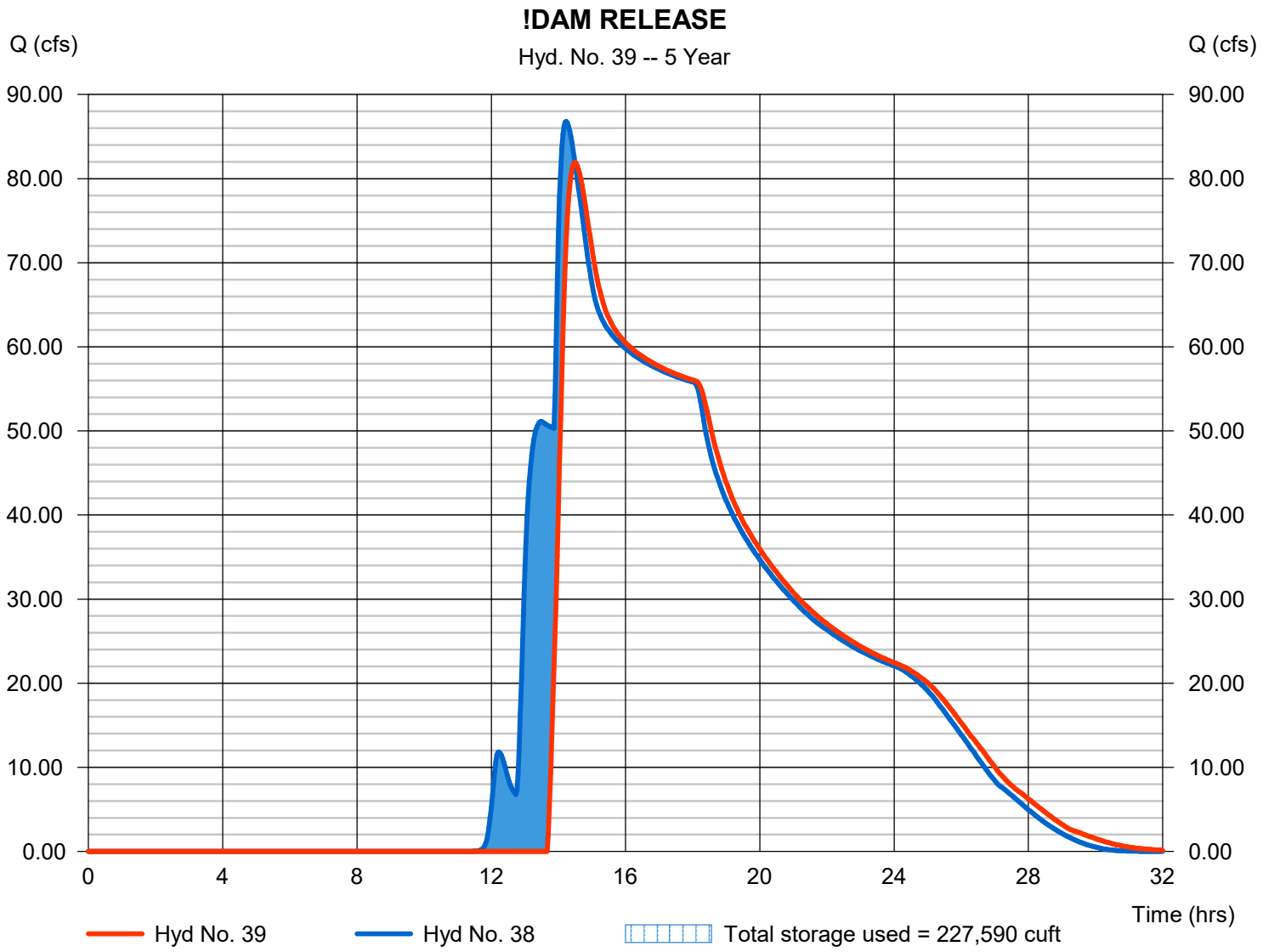
Hydrograph Report

Hyd. No. 39

!DAM RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	81.93 cfs
Storm frequency	=	5 yrs	Time to peak	=	14.50 hrs
Time interval	=	2 min	Hyd. volume	=	1,904,853 cuft
Inflow hyd. No.	=	38 - TOTAL FLOW TO DAM	Max. Elevation	=	942.99 ft
Reservoir name	=	EXISTING DAM	Max. Storage	=	227,590 cuft

Storage Indication method used.

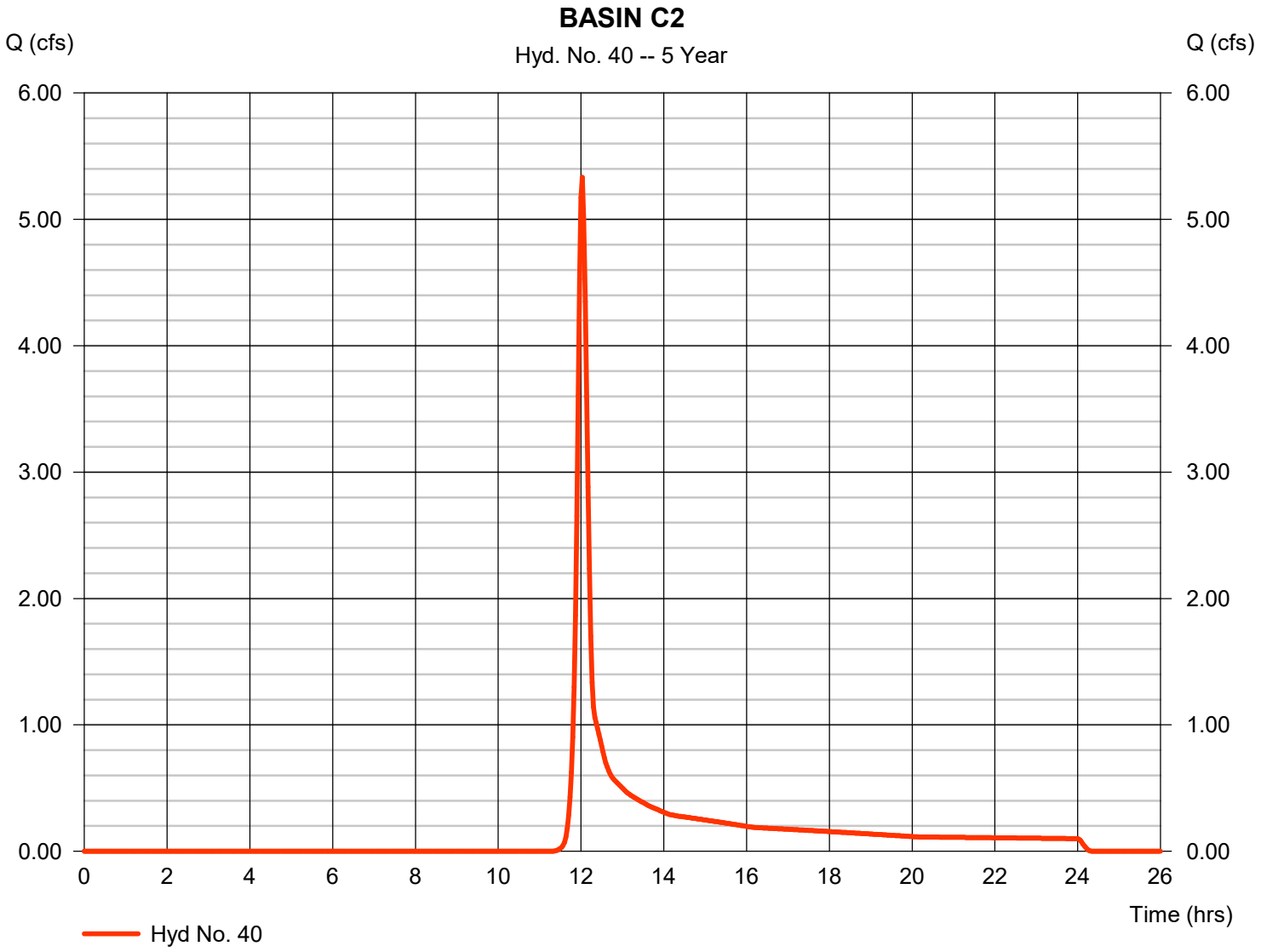


Hydrograph Report

Hyd. No. 40

BASIN C2

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.334 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	14,686 cuft
Drainage area	=	3.810 ac	Curve number	=	67
Basin Slope	=	3.5 %	Hydraulic length	=	457 ft
Tc method	=	LAG	Time of conc. (Tc)	=	13.10 min
Total precip.	=	3.81 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

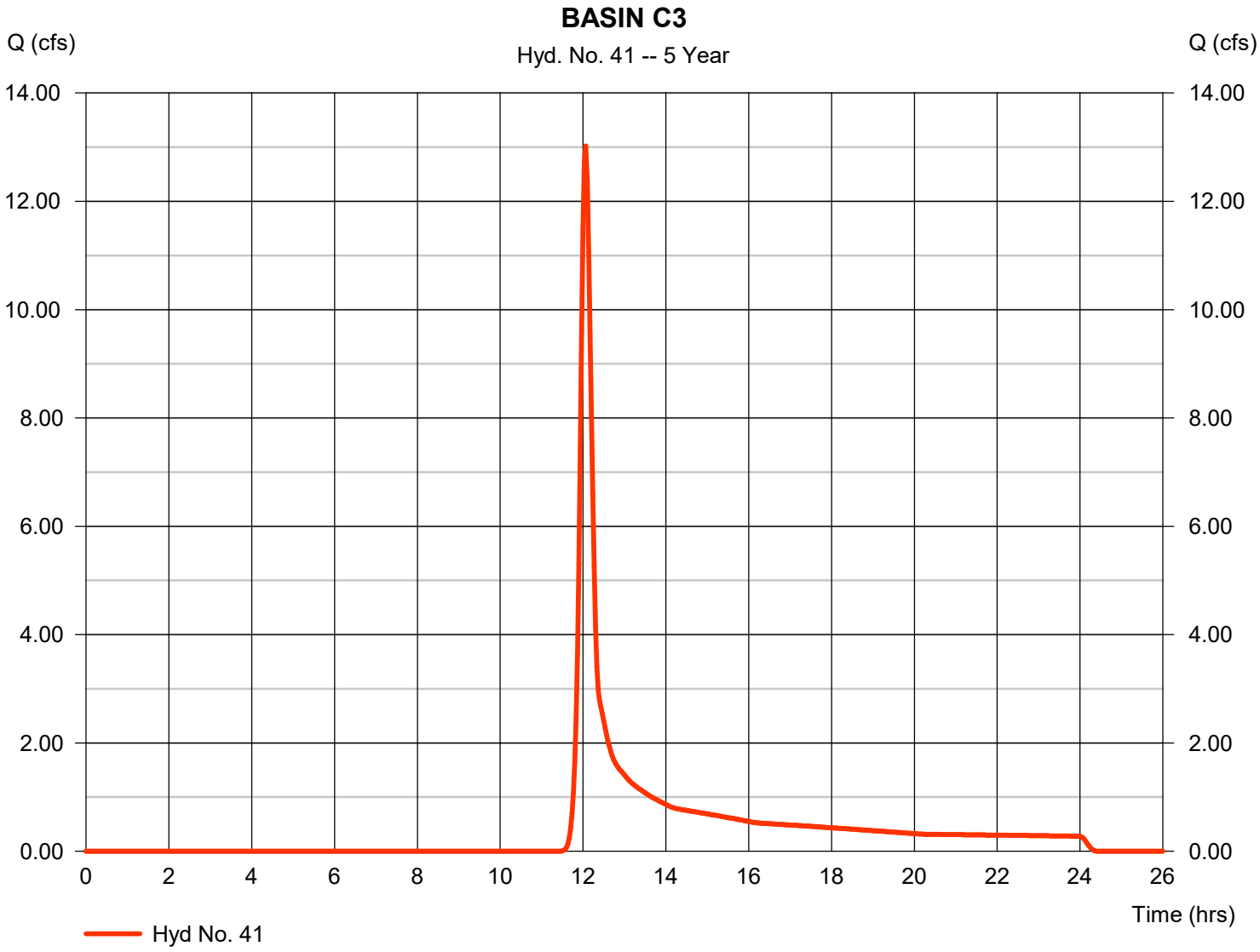


Hydrograph Report

Hyd. No. 41

BASIN C3

Hydrograph type	= SCS Runoff	Peak discharge	= 13.02 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 39,893 cuft
Drainage area	= 11.570 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.81 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

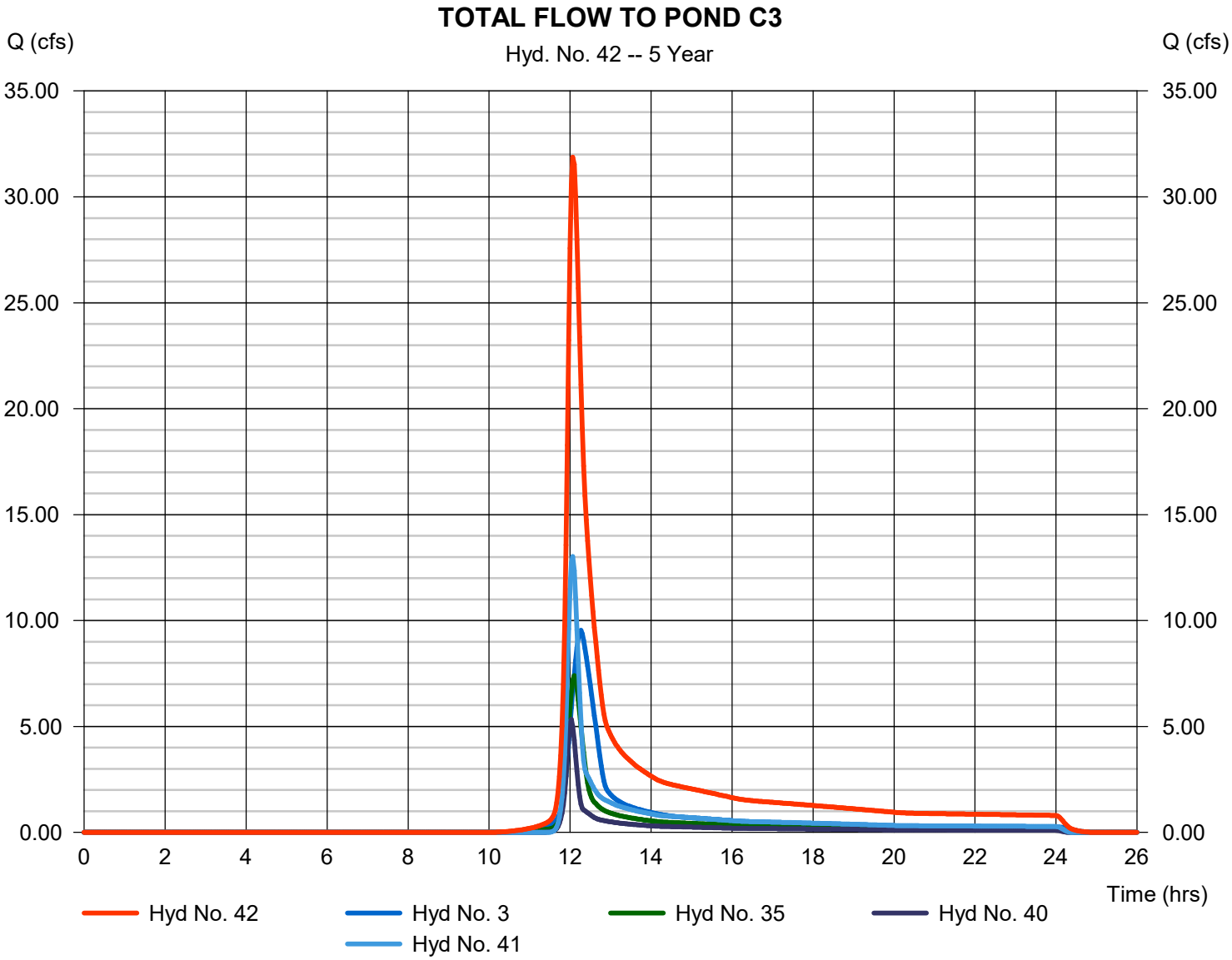


Hydrograph Report

Hyd. No. 42

TOTAL FLOW TO POND C3

Hydrograph type	= Combine	Peak discharge	= 31.88 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 125,332 cuft
Inflow hyds.	= 3, 35, 40, 41	Contrib. drain. area	= 23.520 ac



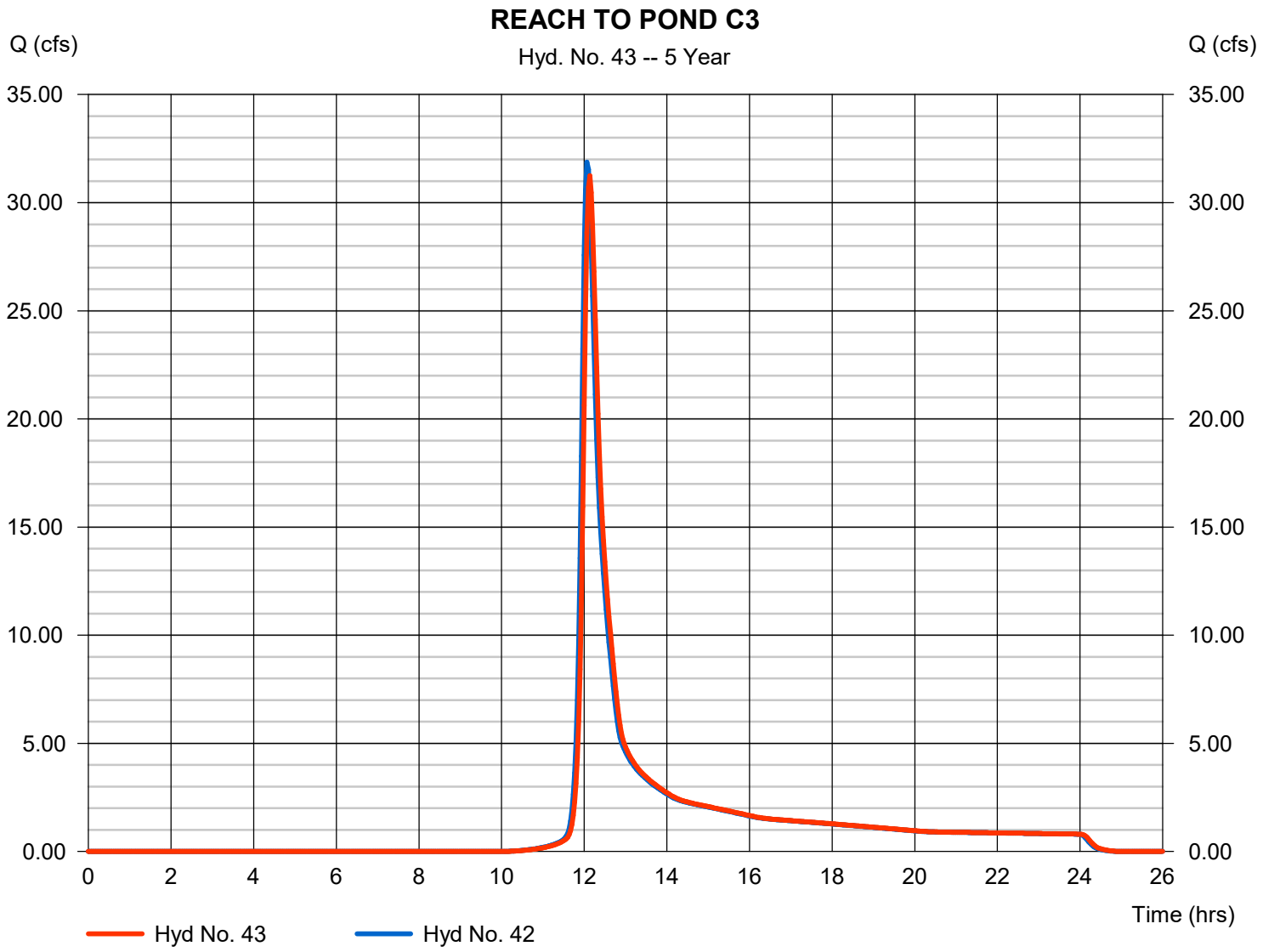
Hydrograph Report

Hyd. No. 43

REACH TO POND C3

Hydrograph type	= Reach	Peak discharge	= 31.24 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 125,330 cuft
Inflow hyd. No.	= 42 - TOTAL FLOW TO POND C3	Section type	= Trapezoidal
Reach length	= 450.0 ft	Channel slope	= 1.0 %
Manning's n	= 0.025	Bottom width	= 20.0 ft
Side slope	= 4.0:1	Max. depth	= 5.0 ft
Rating curve x	= 0.808	Rating curve m	= 1.438
Ave. velocity	= 2.47 ft/s	Routing coeff.	= 0.6433

Modified Att-Kin routing method used.

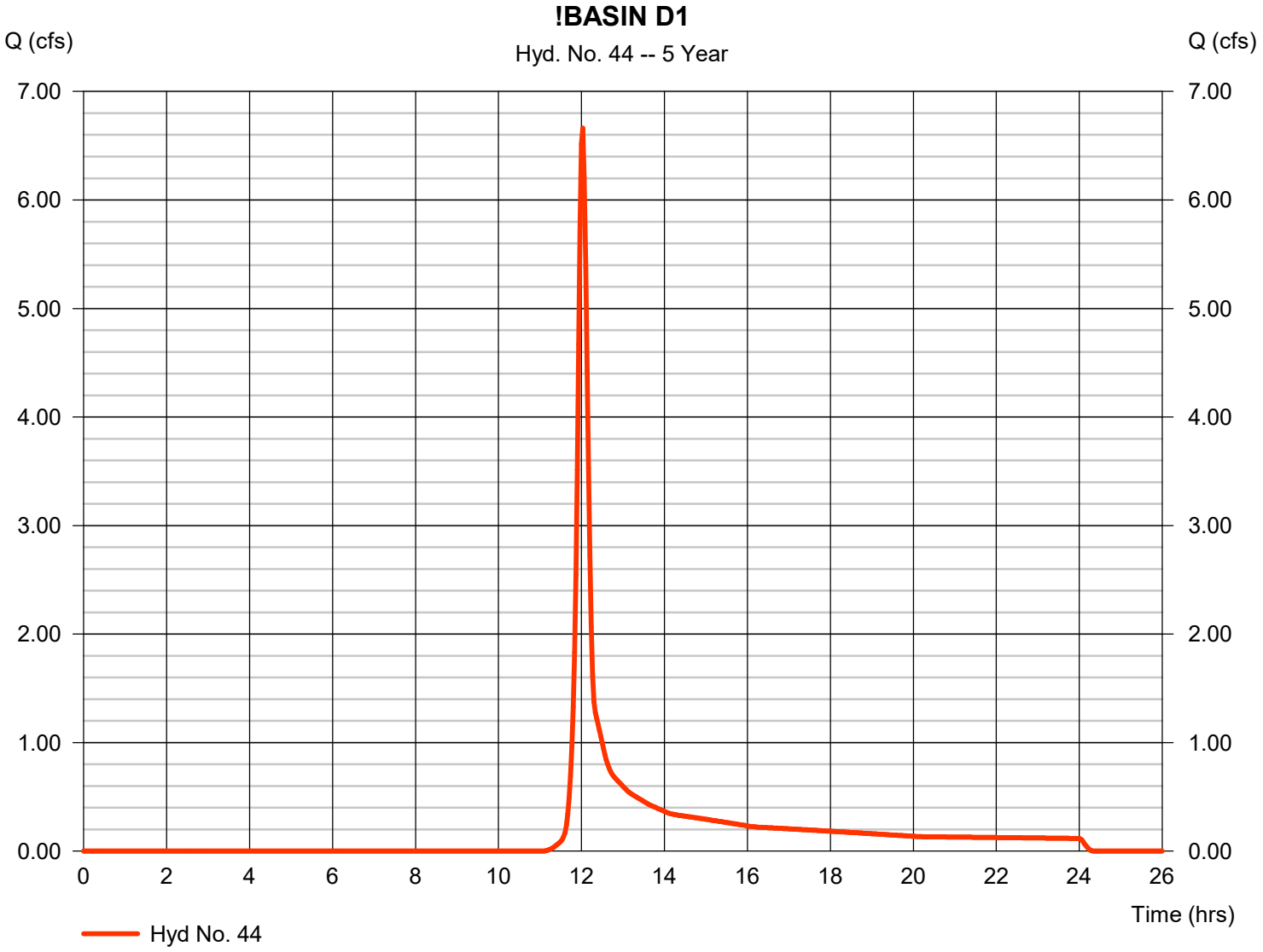


Hydrograph Report

Hyd. No. 44

!BASIN D1

Hydrograph type	= SCS Runoff	Peak discharge	= 6.662 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 17,999 cuft
Drainage area	= 4.200 ac	Curve number	= 69
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.81 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

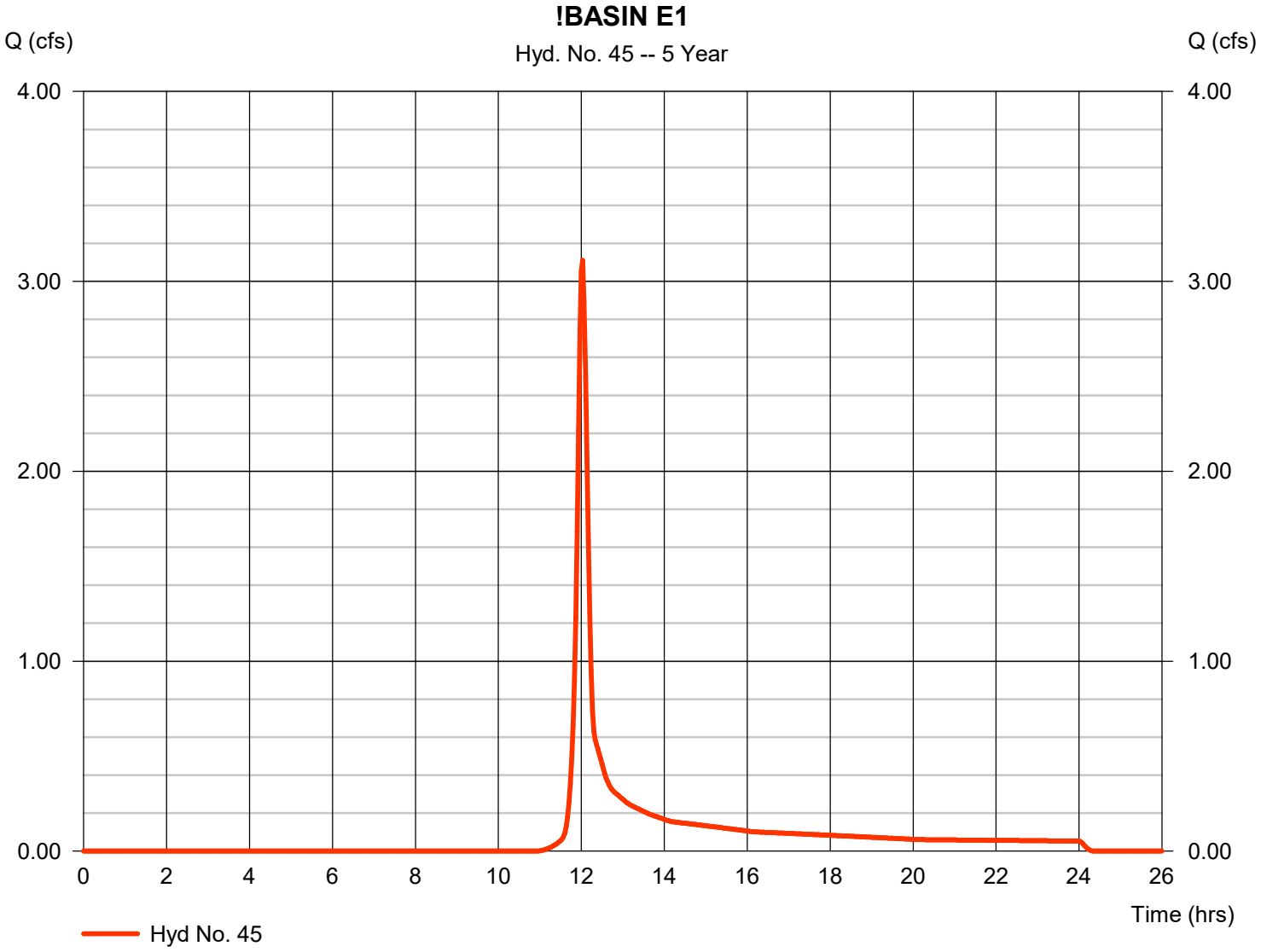


Hydrograph Report

Hyd. No. 45

!BASIN E1

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.111 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	8,342 cuft
Drainage area	=	1.850 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	3.81 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



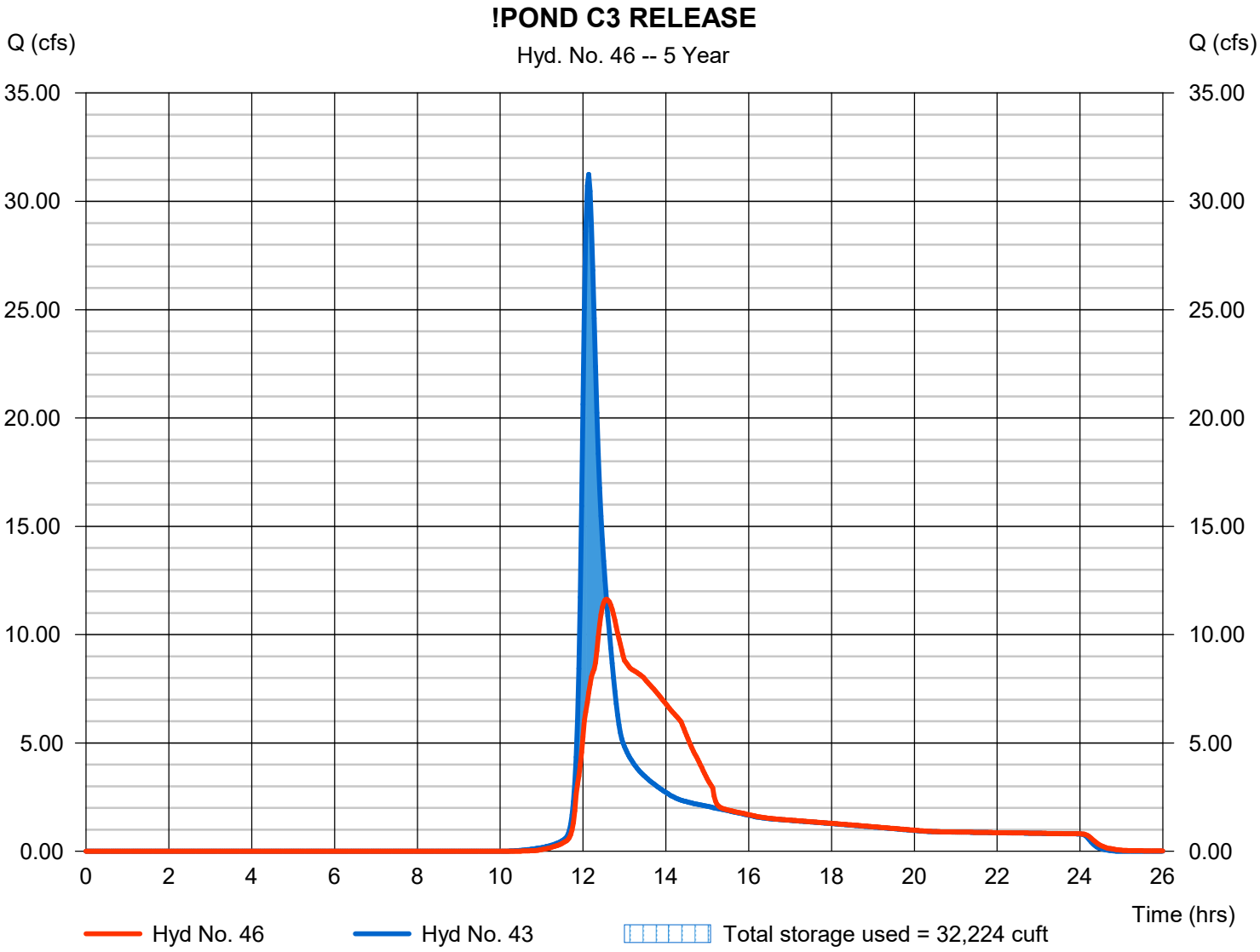
Hydrograph Report

Hyd. No. 46

!POND C3 RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	11.63 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.57 hrs
Time interval	=	2 min	Hyd. volume	=	125,327 cuft
Inflow hyd. No.	=	43 - REACH TO POND C3	Max. Elevation	=	939.49 ft
Reservoir name	=	POND C3	Max. Storage	=	32,224 cuft

Storage Indication method used.

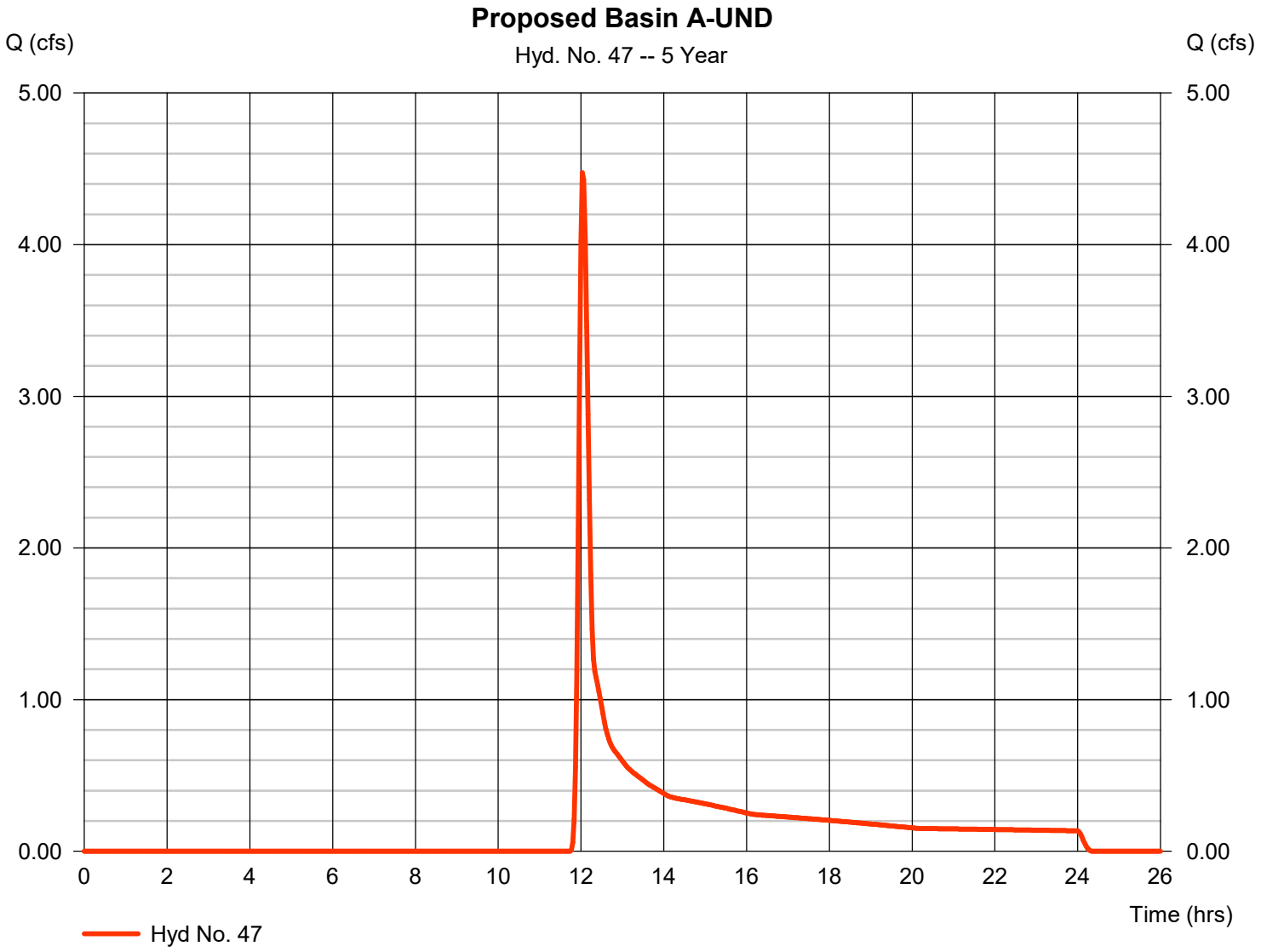


Hydrograph Report

Hyd. No. 47

Proposed Basin A-UND

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.474 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	15,502 cuft
Drainage area	=	7.130 ac	Curve number	=	58
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	3.81 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

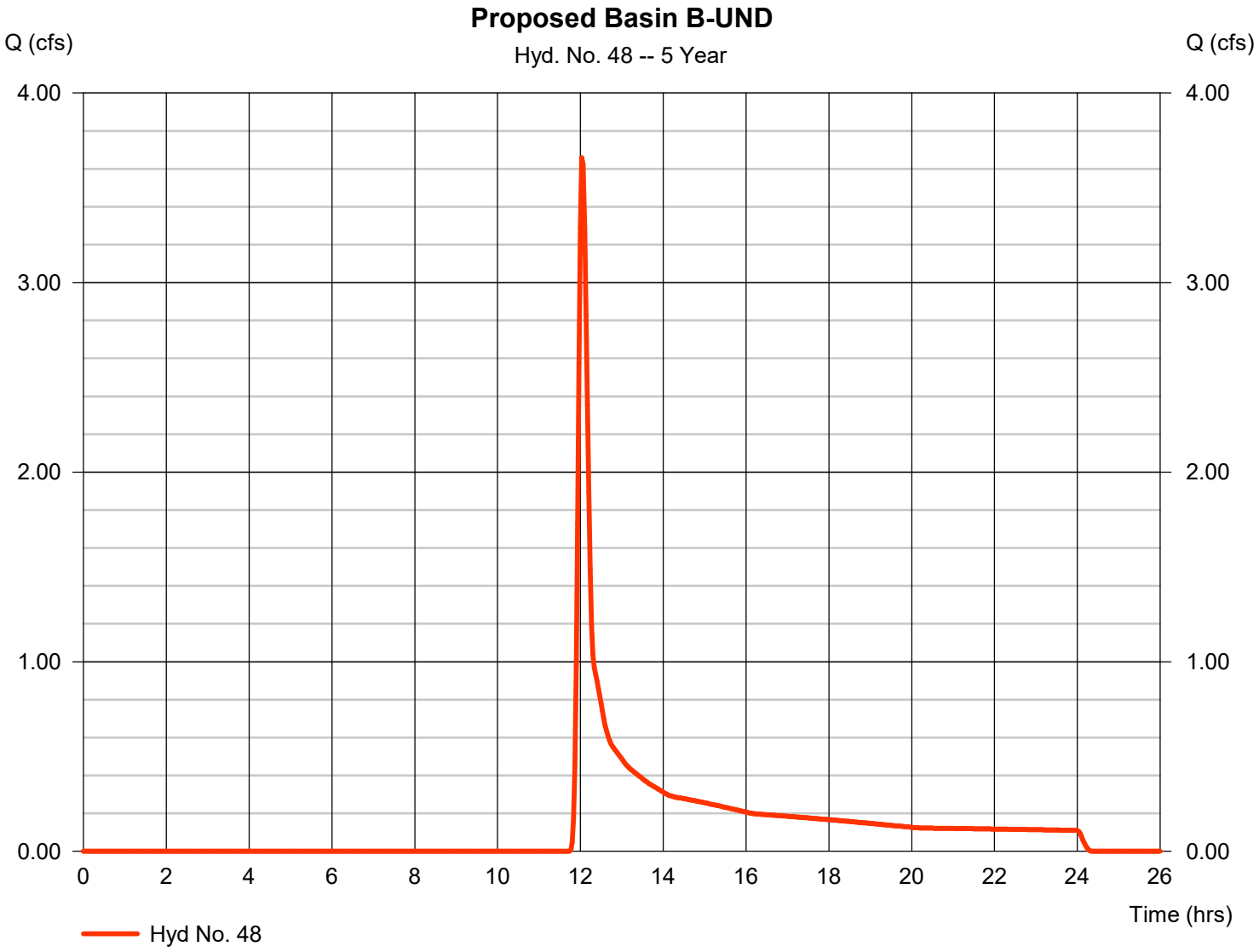


Hydrograph Report

Hyd. No. 48

Proposed Basin B-UND

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.658 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	12,675 cuft
Drainage area	=	5.830 ac	Curve number	=	58
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	3.81 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

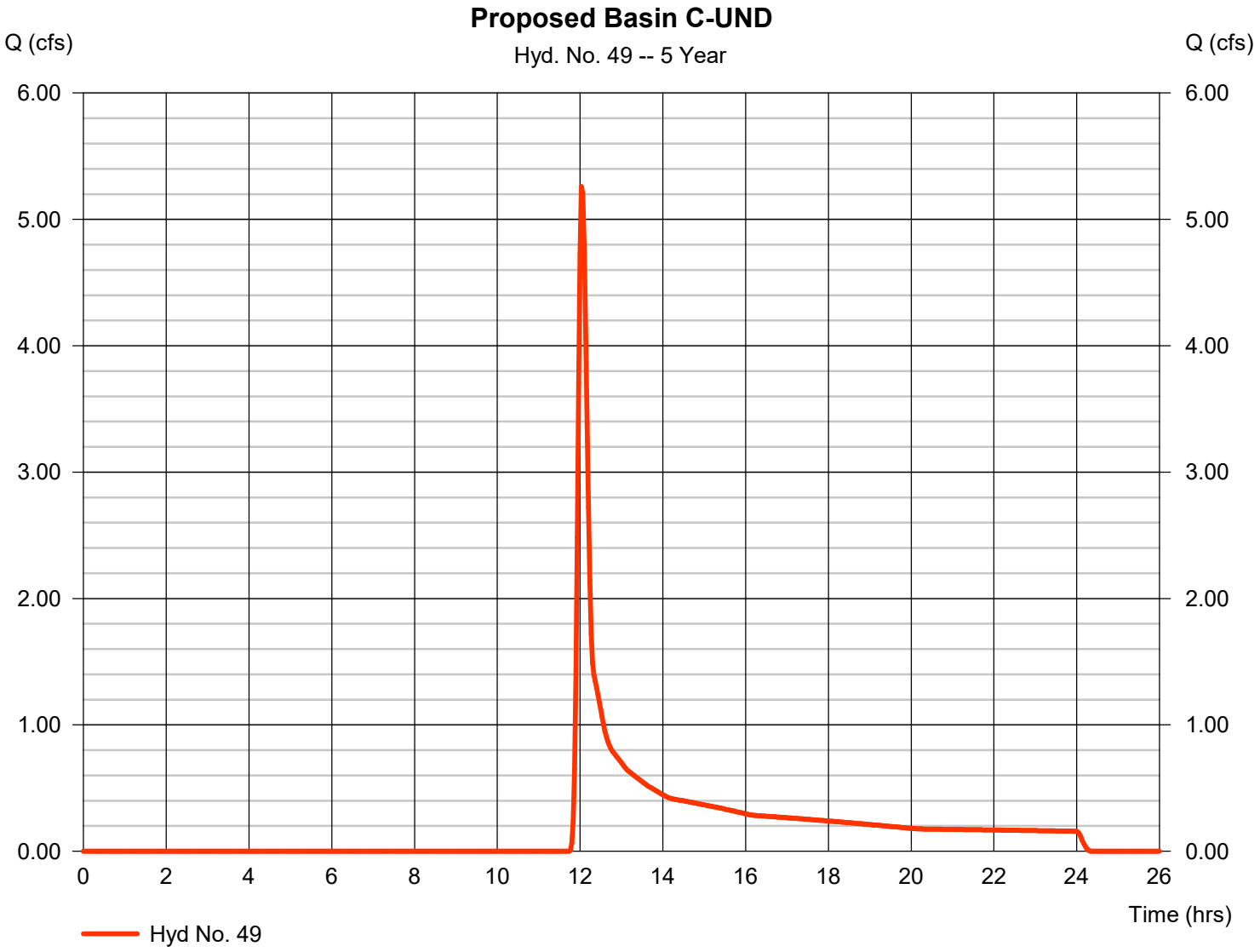


Hydrograph Report

Hyd. No. 49

Proposed Basin C-UND

Hydrograph type	= SCS Runoff	Peak discharge	= 5.258 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 18,219 cuft
Drainage area	= 8.380 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.81 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



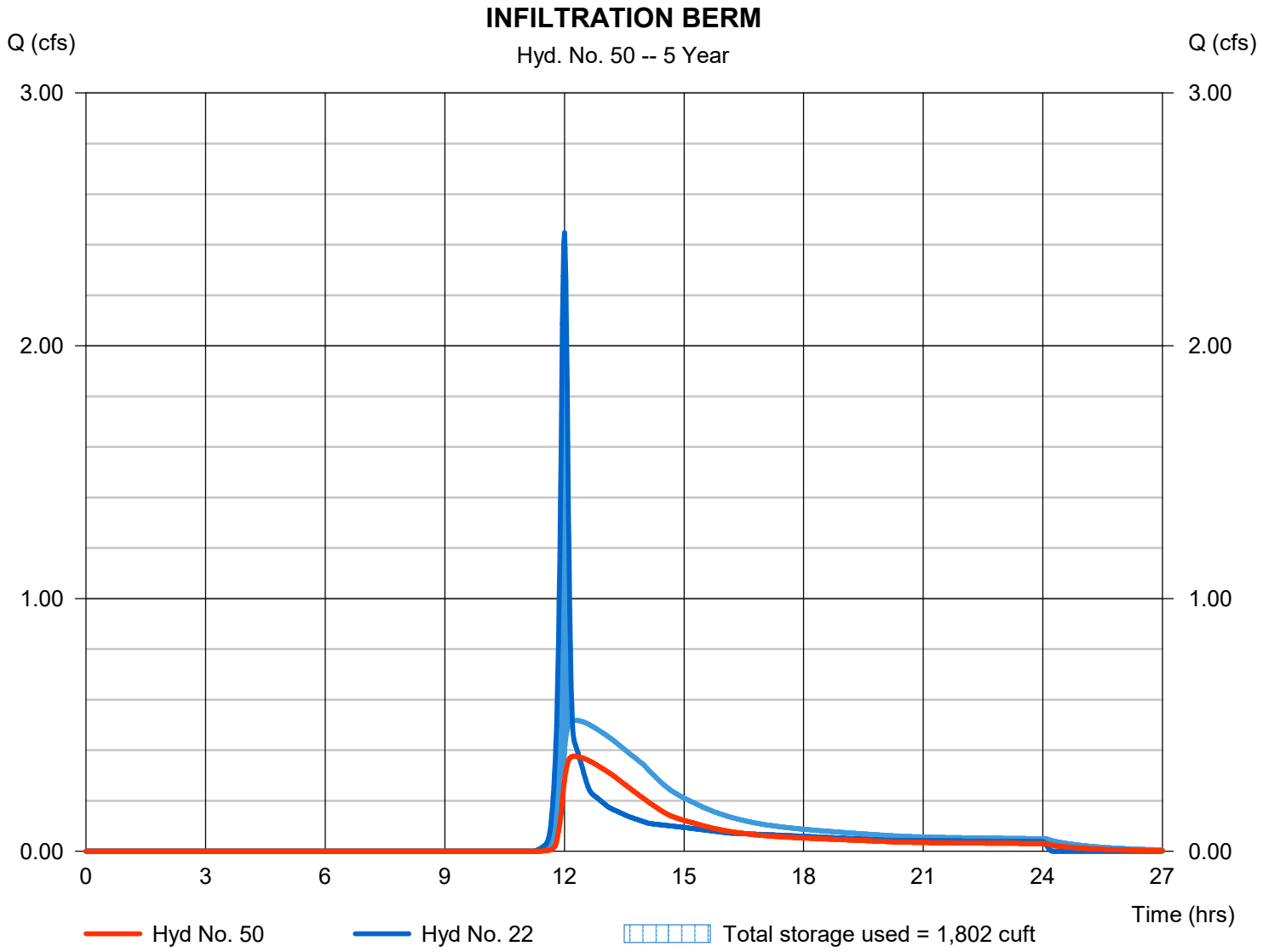
Hydrograph Report

Hyd. No. 50

INFILTRATION BERM

Hydrograph type	=	Reservoir	Peak discharge	=	0.375 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.23 hrs
Time interval	=	1 min	Hyd. volume	=	4,657 cuft
Inflow hyd. No.	=	22 - PROPOSED BASIN B (LOTS 10-11)	Max. Elevation	=	946.43 ft
Reservoir name	=	LOT 10 11	Max. Storage	=	1,802 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



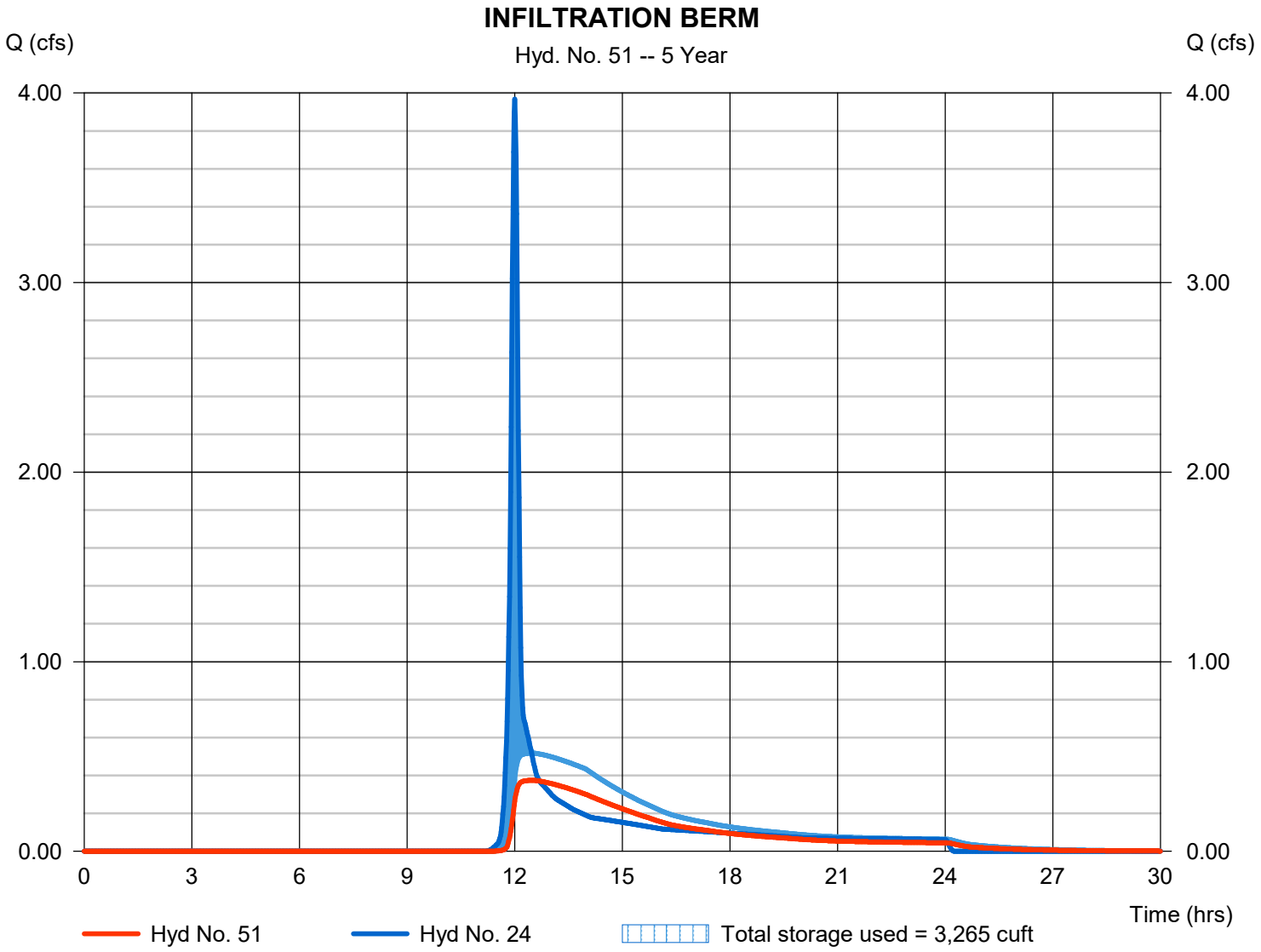
Hydrograph Report

Hyd. No. 51

INFILTRATION BERM

Hydrograph type	=	Reservoir	Peak discharge	=	0.375 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.47 hrs
Time interval	=	1 min	Hyd. volume	=	6,601 cuft
Inflow hyd. No.	=	24 - PROPOSED BASIN B (LOTS 51-52)	Max. Elevation	=	941.43 ft
Reservoir name	=	LOT 51 52	Max. Storage	=	3,265 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	406.78	2	860	7,522,774	------	------	------	Off-Site Basin B (upper)
2	SCS Runoff	13.13	2	724	41,089	------	------	------	Off-Site Basin C1
3	SCS Runoff	27.45	2	734	124,309	------	------	------	Off-Site Basin C2
4	SCS Runoff	173.35	2	782	1,797,958	------	------	------	Off-Site Basin B (lower)
5	Reservoir	137.35	2	820	1,500,308	4	957.17	463,124	Offsite Field Storage
6	SCS Runoff	42.94	2	748	264,192	------	------	------	EXISTING BASIN A
7	SCS Runoff	105.59	2	746	629,239	------	------	------	EXISTING BASIN B
8	SCS Runoff	45.88	2	740	245,861	------	------	------	EXISTING BASIN C
9	SCS Runoff	29.96	2	726	103,455	------	------	------	EXISTING BASIN D
10	SCS Runoff	13.13	2	716	26,791	------	------	------	EXISTING BASIN E
11	SCS Runoff	27.32	2	758	209,072	------	------	------	PROPOSED BASIN A
12	SCS Runoff	69.81	2	754	490,893	------	------	------	PROPOSED BASIN B
13	SCS Runoff	28.26	2	752	197,963	------	------	------	PROPOSED BASIN C
14	SCS Runoff	13.70	2	730	55,078	------	------	------	PROPOSED BASIN D
15	SCS Runoff	10.91	2	718	24,971	------	------	------	PROPOSED BASIN E
16	Reservoir	3.502	2	898	209,059	11	935.42	116,512	!POND A RELEASE
17	SCS Runoff	32.34	2	722	91,072	------	------	------	PROPOSED BASIN B1
18	SCS Runoff	31.10	2	736	142,394	------	------	------	PROPOSED BASIN B2
19	SCS Runoff	14.58	2	732	59,038	------	------	------	PROPOSED BASIN B3
20	SCS Runoff	18.11	2	724	56,945	------	------	------	PROPOSED BASIN B4
21	SCS Runoff	9.280	2	726	32,313	------	------	------	PROPOSED BASIN B5
22	SCS Runoff	8.162	1	719	18,462	------	------	------	PROPOSED BASIN B (LOTS 10-11)
23	SCS Runoff	4.506	2	722	12,634	------	------	------	PROPOSED BASIN B (LOTS 22-23)
24	SCS Runoff	13.23	1	719	29,921	------	------	------	PROPOSED BASIN B (LOTS 51-52)
25	SCS Runoff	6.529	2	728	24,322	------	------	------	PROPOSED BASIN B (UND TO DAM
26	Reservoir	10.38	2	736	86,153	17	938.74	35,289	!POND B1 RELEASE
27	Reservoir	13.57	2	760	137,801	18	941.89	45,904	POND B2 RELEASE
28	Diversion1	48.00	2	718	2,566,277	1	------	------	Pass Through 170th
29	Diversion2	358.78	2	860	4,956,494	1	------	------	Field Storage Volume
30	Reservoir	48.00	2	824	2,487,752	28	957.83	114,247	Offsite Field Storage
31	Combine	185.35	2	820	3,988,059	5, 30	------	------	Off-Site B Flow
32	Reach	185.26	2	824	3,988,046	31	------	------	REACH TO DAM
33	Reservoir	0.829	2	908	59,034	19	941.26	33,523	POND B3 RELEASE
34	SCS Runoff	11.36	2	726	39,791	------	------	------	PROPOSED BASIN C1

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

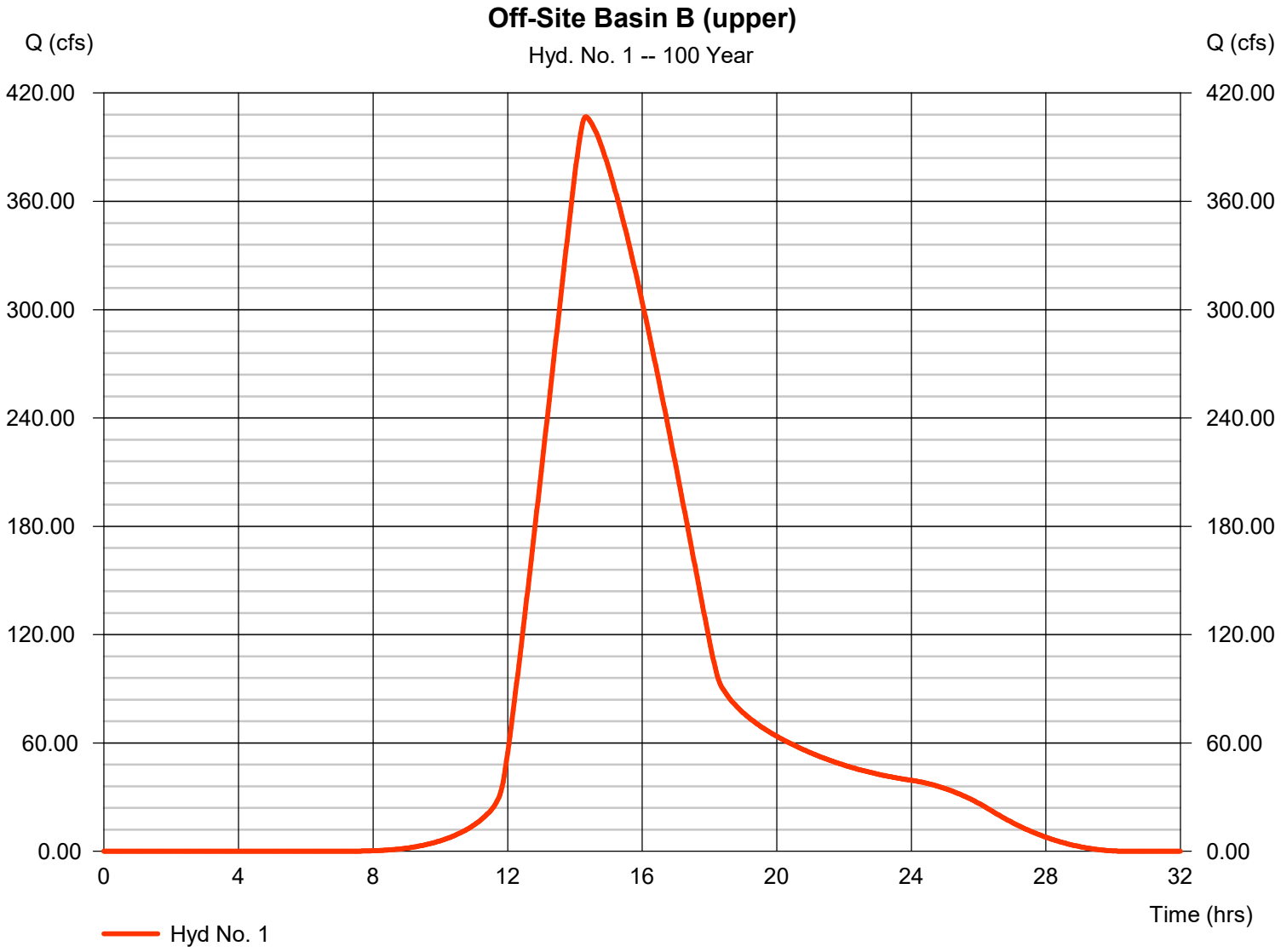
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
35	Combine	24.28	2	726	80,879	2, 34	------	------	FLOW TO POND C1
36	Combine	27.26	2	726	89,258	20, 21,	------	------	COMBINE B4 B5
37	Reach	24.81	2	730	89,255	36	------	------	REACH TO DAM
38	Combine	195.69	2	822	4,252,055	23, 25, 27, 32, 37	------	------	TOTAL FLOW TO DAM
39	Reservoir	194.31	2	832	4,093,896	38	943.76	296,169	!DAM RELEASE
40	SCS Runoff	18.68	2	720	48,534	------	------	------	BASIN C2
41	SCS Runoff	47.97	2	722	135,090	------	------	------	BASIN C3
42	Combine	109.07	2	724	388,812	3, 35, 40, 41	------	------	TOTAL FLOW TO POND C3
43	Reach	108.52	2	726	388,810	42	------	------	REACH TO POND C3
44	SCS Runoff	21.90	2	720	56,799	------	------	------	!BASIN D1
45	SCS Runoff	9.933	2	720	25,751	------	------	------	!BASIN E1
46	Reservoir	47.14	2	744	388,808	43	941.49	100,913	!POND C3 RELEASE
47	SCS Runoff	25.09	2	722	66,490	------	------	------	Proposed Basin A-UND
48	SCS Runoff	20.51	2	722	54,367	------	------	------	Proposed Basin B-UND
49	SCS Runoff	29.49	2	722	78,147	------	------	------	Proposed Basin C-UND
50	Reservoir	8.081	1	720	16,431	22	946.56	1,985	INFILTRATION BERM
51	Reservoir	13.08	1	720	25,027	24	941.55	3,588	INFILTRATION BERM

Hydrograph Report

Hyd. No. 1

Off-Site Basin B (upper)

Hydrograph type	= SCS Runoff	Peak discharge	= 406.78 cfs
Storm frequency	= 100 yrs	Time to peak	= 14.33 hrs
Time interval	= 2 min	Hyd. volume	= 7,522,774 cuft
Drainage area	= 487.010 ac	Curve number	= 75
Basin Slope	= 0.8 %	Hydraulic length	= 8797 ft
Tc method	= LAG	Time of conc. (Tc)	= 243.10 min
Total precip.	= 7.12 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

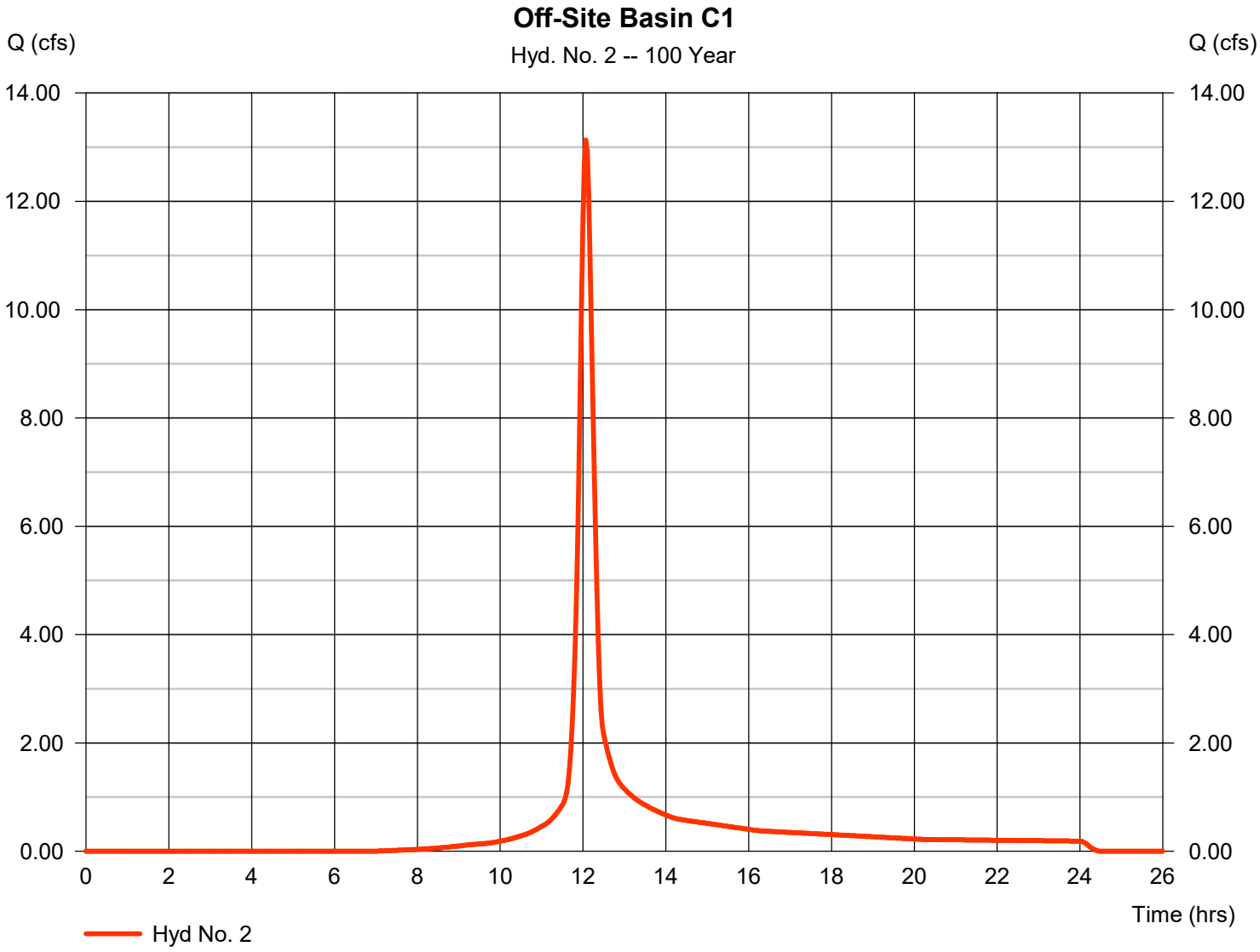


Hydrograph Report

Hyd. No. 2

Off-Site Basin C1

Hydrograph type	=	SCS Runoff	Peak discharge	=	13.13 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	41,089 cuft
Drainage area	=	2.660 ac	Curve number	=	75
Basin Slope	=	0.8 %	Hydraulic length	=	392 ft
Tc method	=	LAG	Time of conc. (Tc)	=	20.10 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

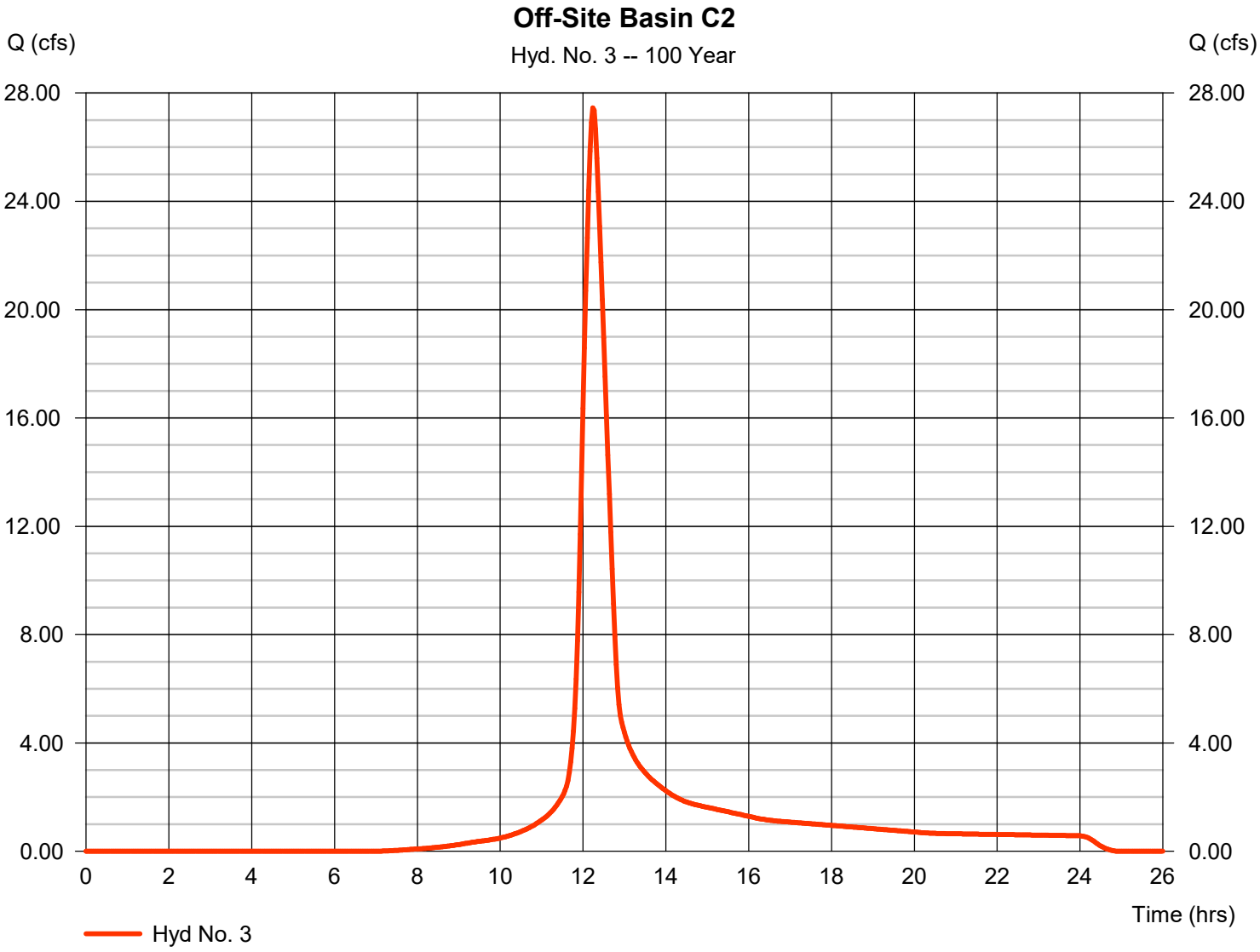


Hydrograph Report

Hyd. No. 3

Off-Site Basin C2

Hydrograph type	=	SCS Runoff	Peak discharge	=	27.45 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.23 hrs
Time interval	=	2 min	Hyd. volume	=	124,309 cuft
Drainage area	=	8.140 ac	Curve number	=	75
Basin Slope	=	0.8 %	Hydraulic length	=	820 ft
Tc method	=	LAG	Time of conc. (Tc)	=	36.40 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

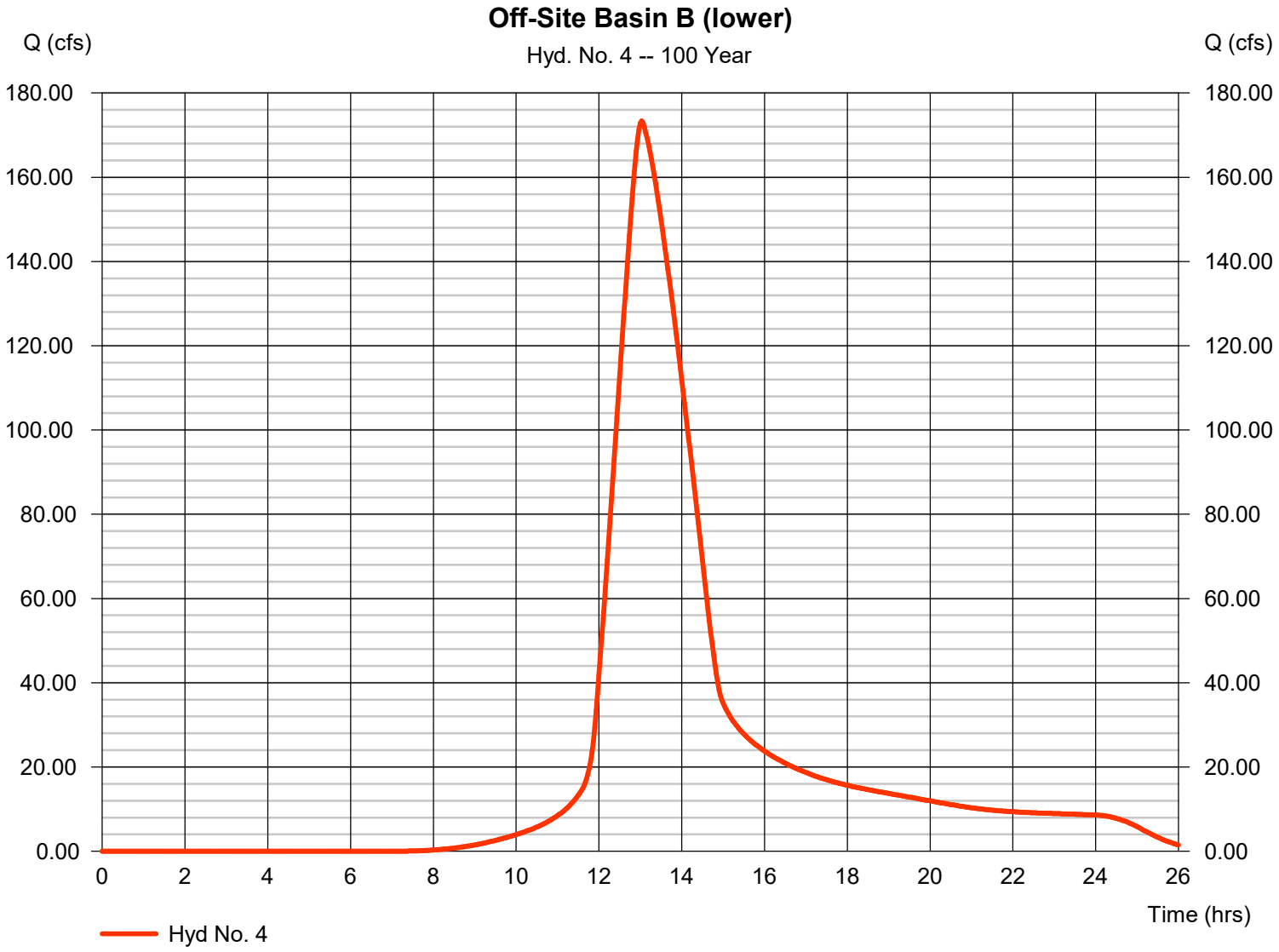


Hydrograph Report

Hyd. No. 4

Off-Site Basin B (lower)

Hydrograph type	=	SCS Runoff	Peak discharge	=	173.35 cfs
Storm frequency	=	100 yrs	Time to peak	=	13.03 hrs
Time interval	=	2 min	Hyd. volume	=	1,797,958 cuft
Drainage area	=	115.970 ac	Curve number	=	75
Basin Slope	=	0.8 %	Hydraulic length	=	3400 ft
Tc method	=	LAG	Time of conc. (Tc)	=	113.60 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



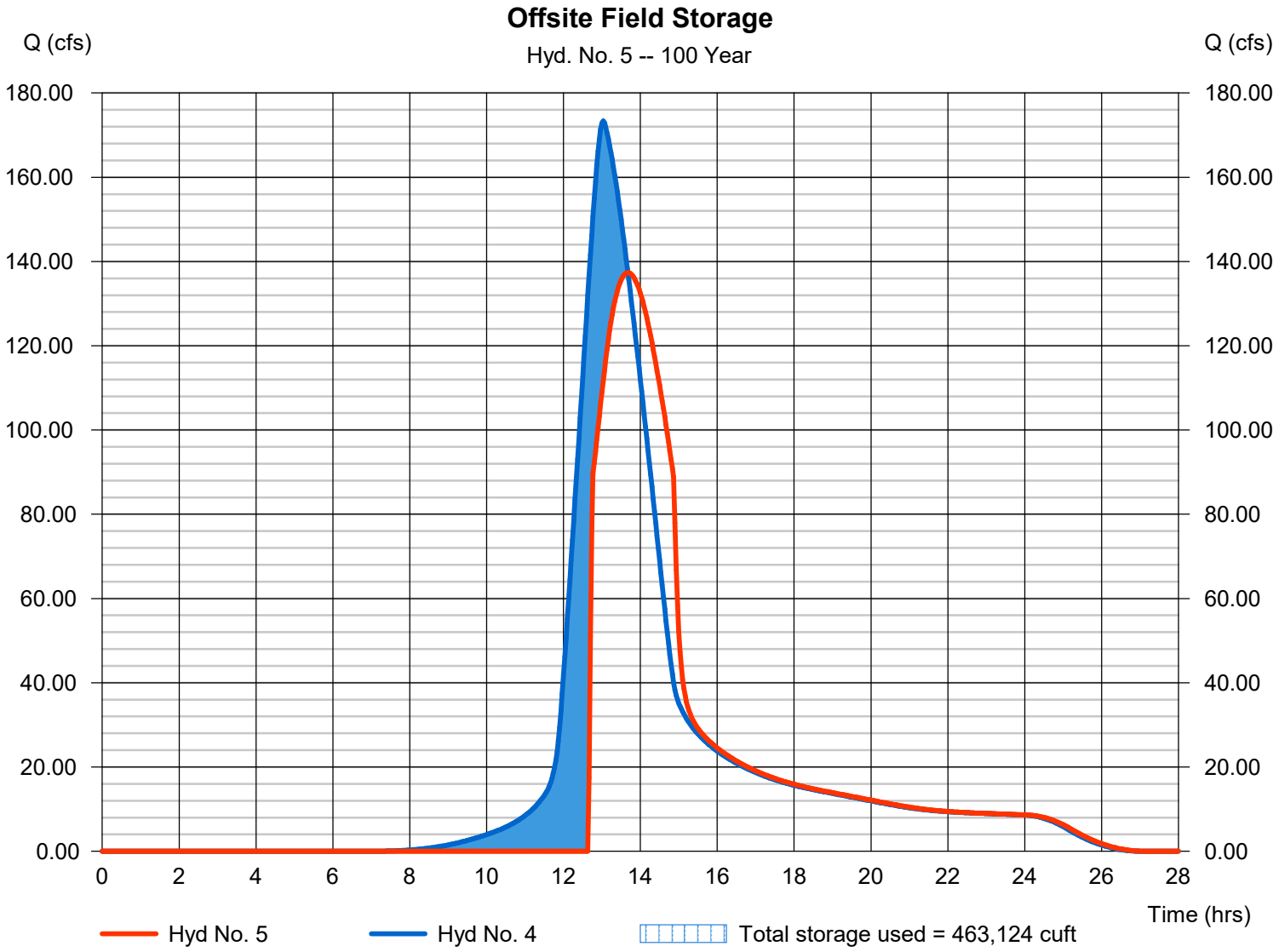
Hydrograph Report

Hyd. No. 5

Offsite Field Storage

Hydrograph type	=	Reservoir	Peak discharge	=	137.35 cfs
Storm frequency	=	100 yrs	Time to peak	=	13.67 hrs
Time interval	=	2 min	Hyd. volume	=	1,500,308 cuft
Inflow hyd. No.	=	4 - Off-Site Basin B (lower)	Max. Elevation	=	957.17 ft
Reservoir name	=	Offsite Field Storage LOWER	Max. Storage	=	463,124 cuft

Storage Indication method used.

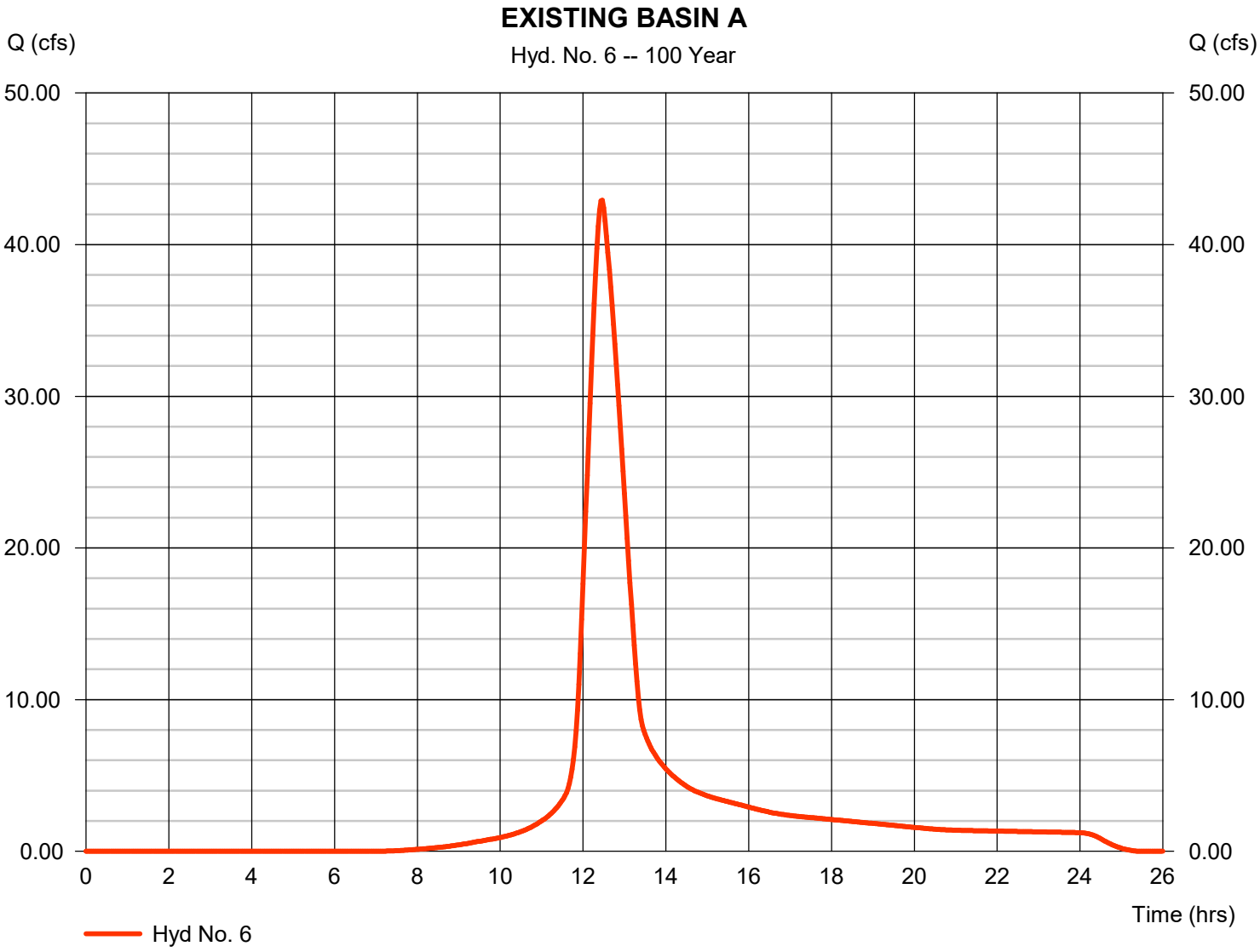


Hydrograph Report

Hyd. No. 6

EXISTING BASIN A

Hydrograph type	=	SCS Runoff	Peak discharge	=	42.94 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.47 hrs
Time interval	=	2 min	Hyd. volume	=	264,192 cuft
Drainage area	=	17.230 ac	Curve number	=	75
Basin Slope	=	1.8 %	Hydraulic length	=	2500 ft
Tc method	=	LAG	Time of conc. (Tc)	=	57.00 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

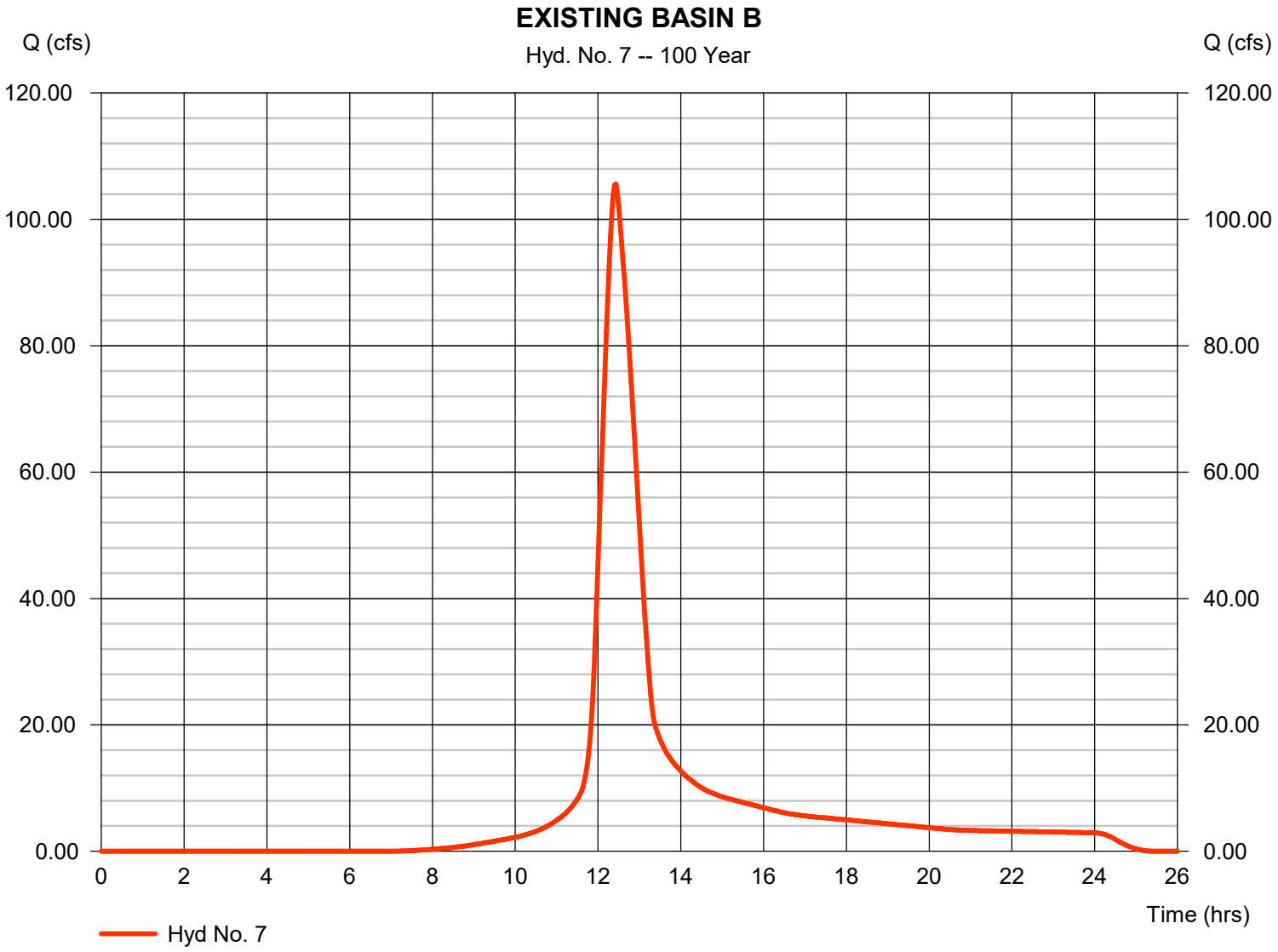


Hydrograph Report

Hyd. No. 7

EXISTING BASIN B

Hydrograph type	=	SCS Runoff	Peak discharge	=	105.59 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.43 hrs
Time interval	=	2 min	Hyd. volume	=	629,239 cuft
Drainage area	=	40.420 ac	Curve number	=	75
Basin Slope	=	1.1 %	Hydraulic length	=	1712 ft
Tc method	=	LAG	Time of conc. (Tc)	=	53.40 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

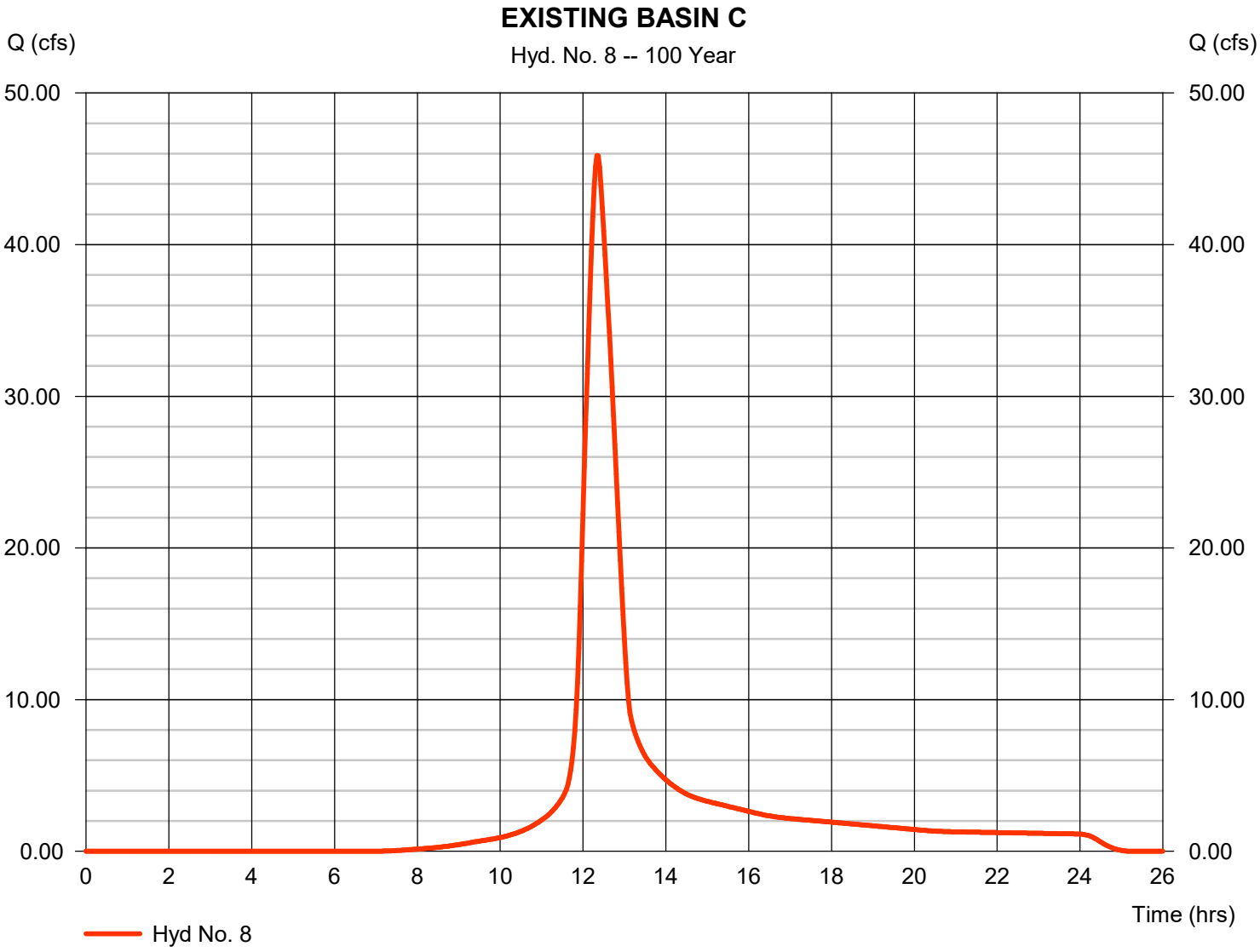


Hydrograph Report

Hyd. No. 8

EXISTING BASIN C

Hydrograph type	=	SCS Runoff	Peak discharge	=	45.88 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.33 hrs
Time interval	=	2 min	Hyd. volume	=	245,861 cuft
Drainage area	=	16.060 ac	Curve number	=	75
Basin Slope	=	1.8 %	Hydraulic length	=	1825 ft
Tc method	=	LAG	Time of conc. (Tc)	=	44.10 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

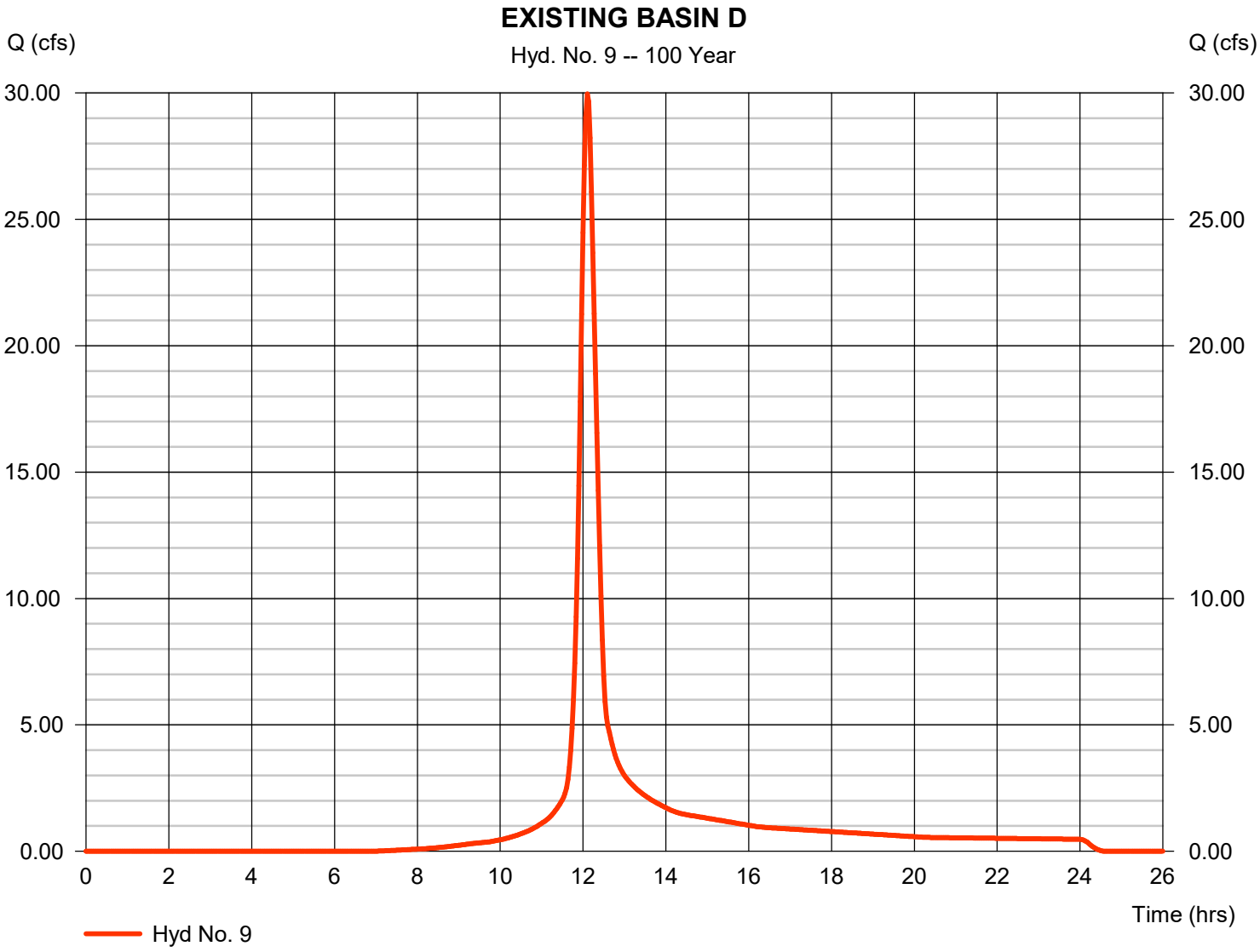


Hydrograph Report

Hyd. No. 9

EXISTING BASIN D

Hydrograph type	=	SCS Runoff	Peak discharge	=	29.96 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	103,455 cuft
Drainage area	=	6.580 ac	Curve number	=	75
Basin Slope	=	2.4 %	Hydraulic length	=	970 ft
Tc method	=	LAG	Time of conc. (Tc)	=	23.40 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

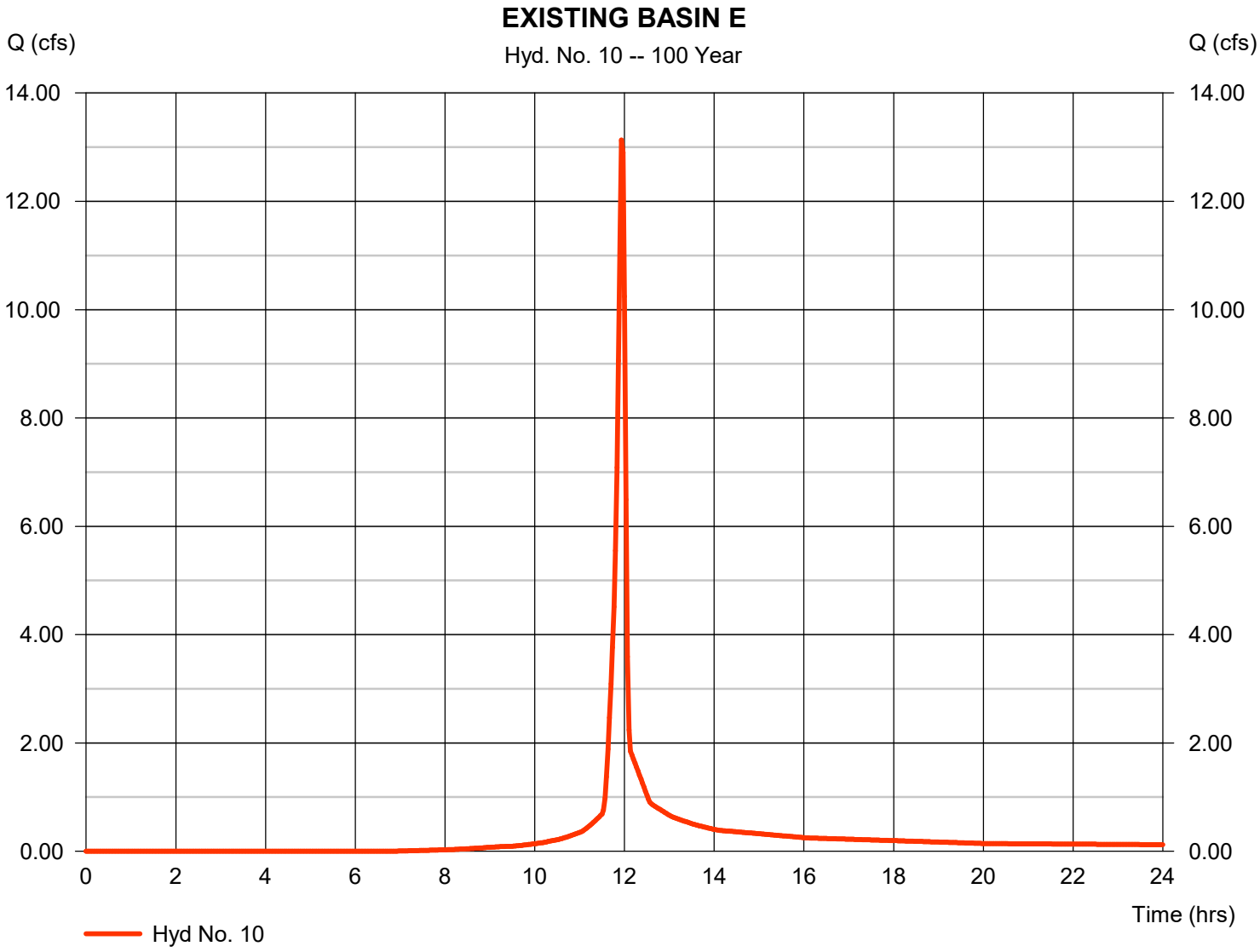


Hydrograph Report

Hyd. No. 10

EXISTING BASIN E

Hydrograph type	=	SCS Runoff	Peak discharge	=	13.13 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	26,791 cuft
Drainage area	=	1.850 ac	Curve number	=	75
Basin Slope	=	2.1 %	Hydraulic length	=	175 ft
Tc method	=	LAG	Time of conc. (Tc)	=	6.20 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

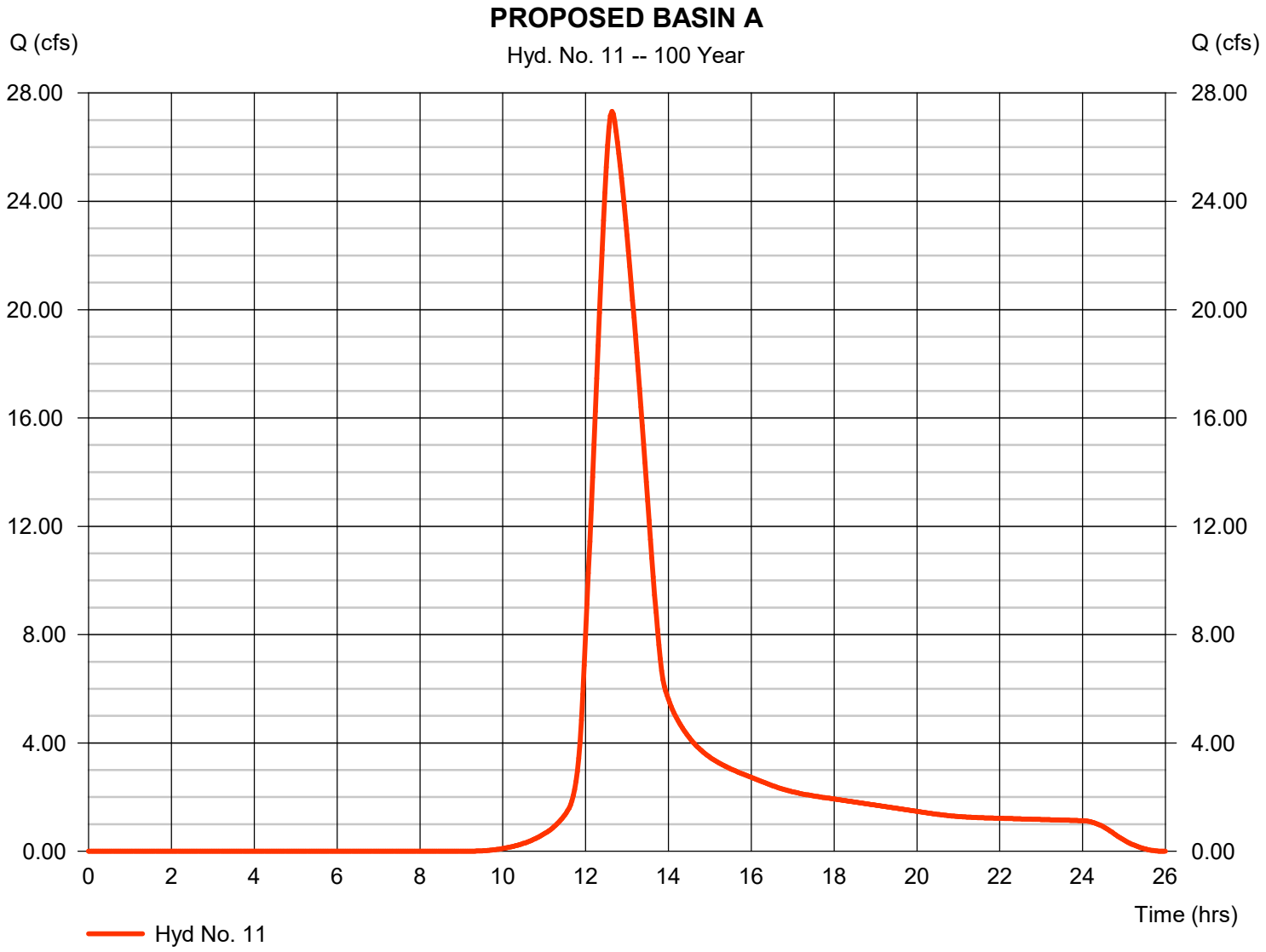


Hydrograph Report

Hyd. No. 11

PROPOSED BASIN A

Hydrograph type	= SCS Runoff	Peak discharge	= 27.32 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.63 hrs
Time interval	= 2 min	Hyd. volume	= 209,072 cuft
Drainage area	= 17.360 ac	Curve number	= 66
Basin Slope	= 1.8 %	Hydraulic length	= 2500 ft
Tc method	= LAG	Time of conc. (Tc)	= 72.80 min
Total precip.	= 7.12 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

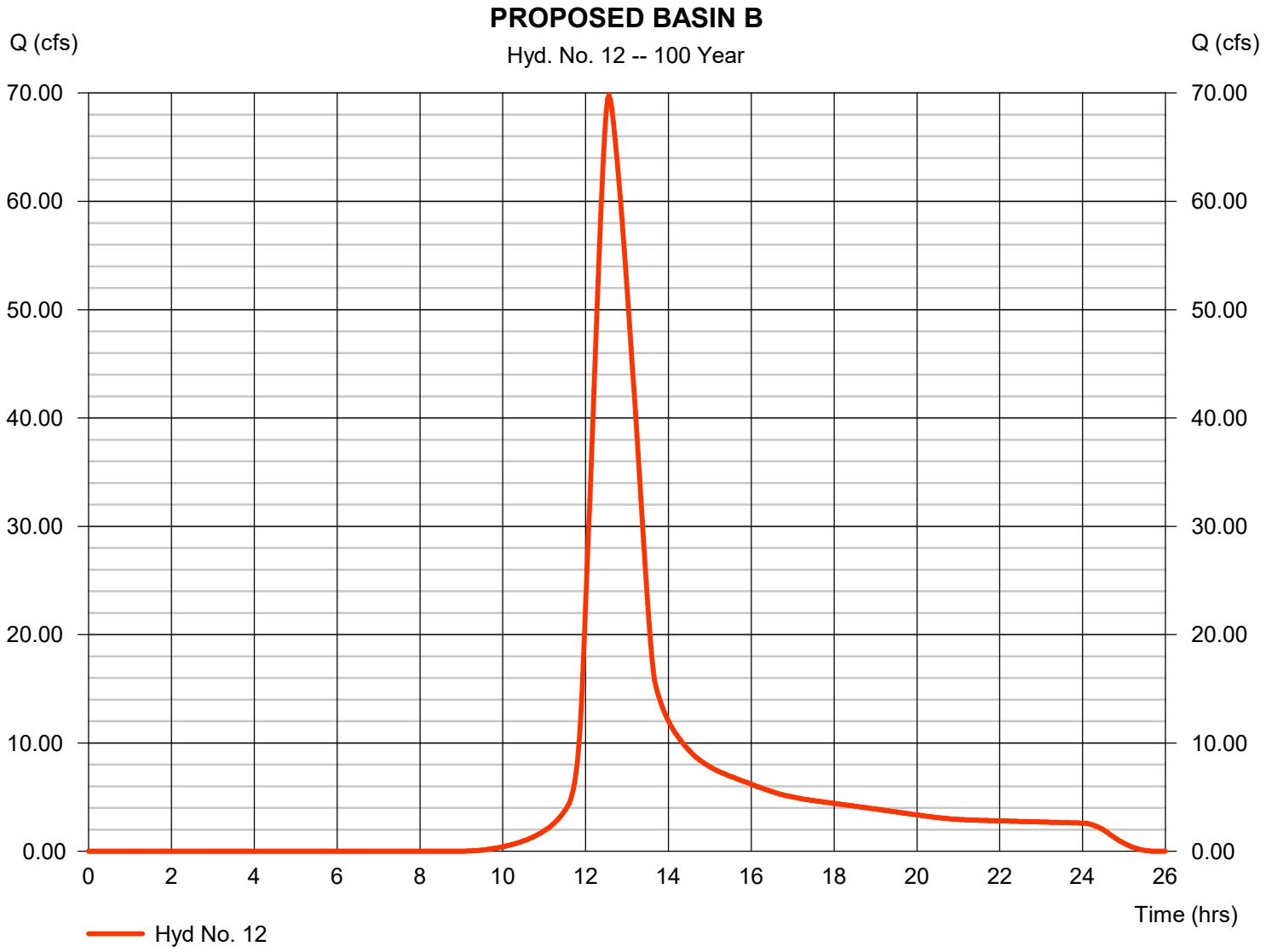


Hydrograph Report

Hyd. No. 12

PROPOSED BASIN B

Hydrograph type	= SCS Runoff	Peak discharge	= 69.81 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.57 hrs
Time interval	= 2 min	Hyd. volume	= 490,893 cuft
Drainage area	= 39.990 ac	Curve number	= 67
Basin Slope	= 1.1 %	Hydraulic length	= 1712 ft
Tc method	= LAG	Time of conc. (Tc)	= 66.50 min
Total precip.	= 7.12 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

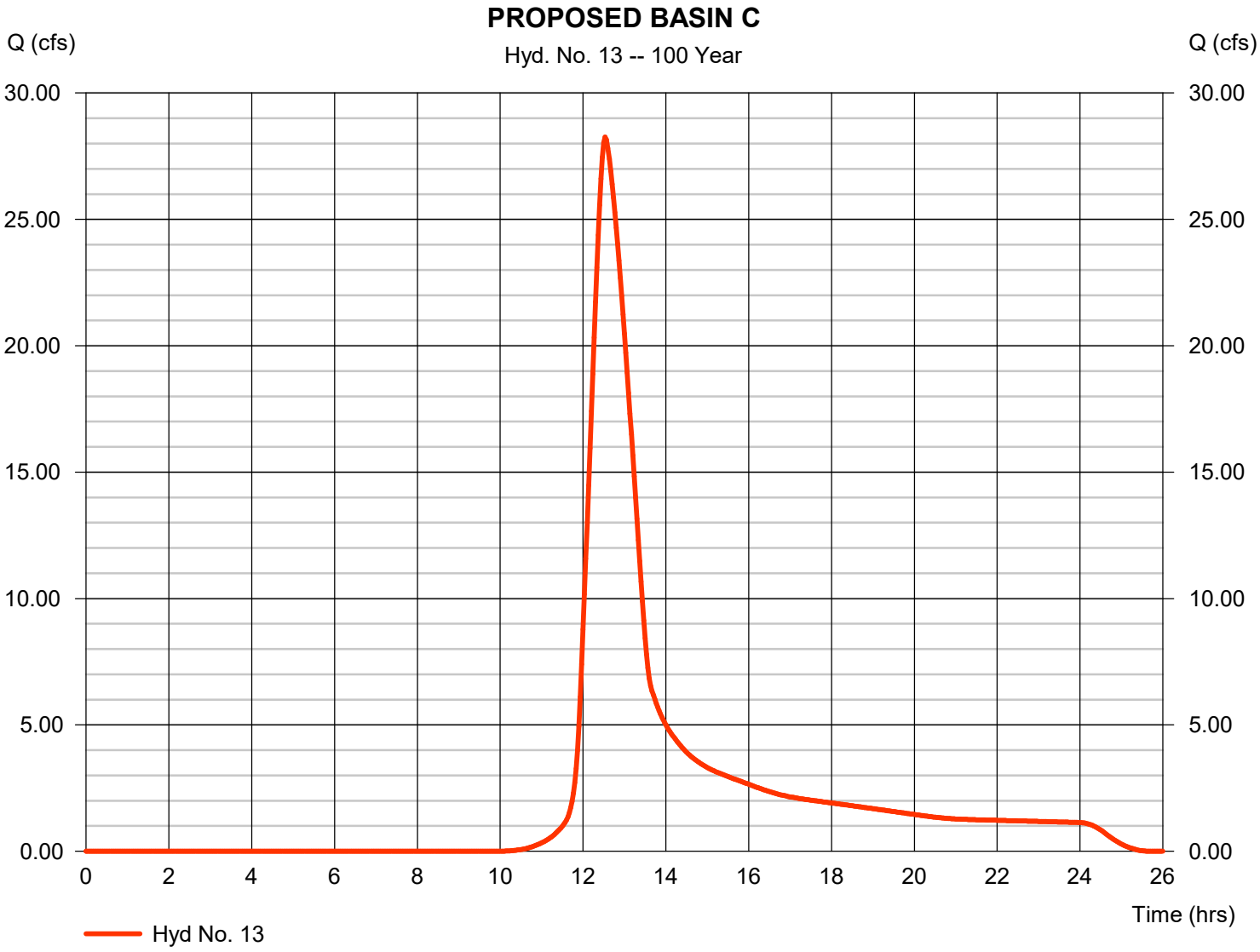


Hydrograph Report

Hyd. No. 13

PROPOSED BASIN C

Hydrograph type	=	SCS Runoff	Peak discharge	=	28.26 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.53 hrs
Time interval	=	2 min	Hyd. volume	=	197,963 cuft
Drainage area	=	18.750 ac	Curve number	=	62
Basin Slope	=	1.8 %	Hydraulic length	=	1825 ft
Tc method	=	LAG	Time of conc. (Tc)	=	62.40 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

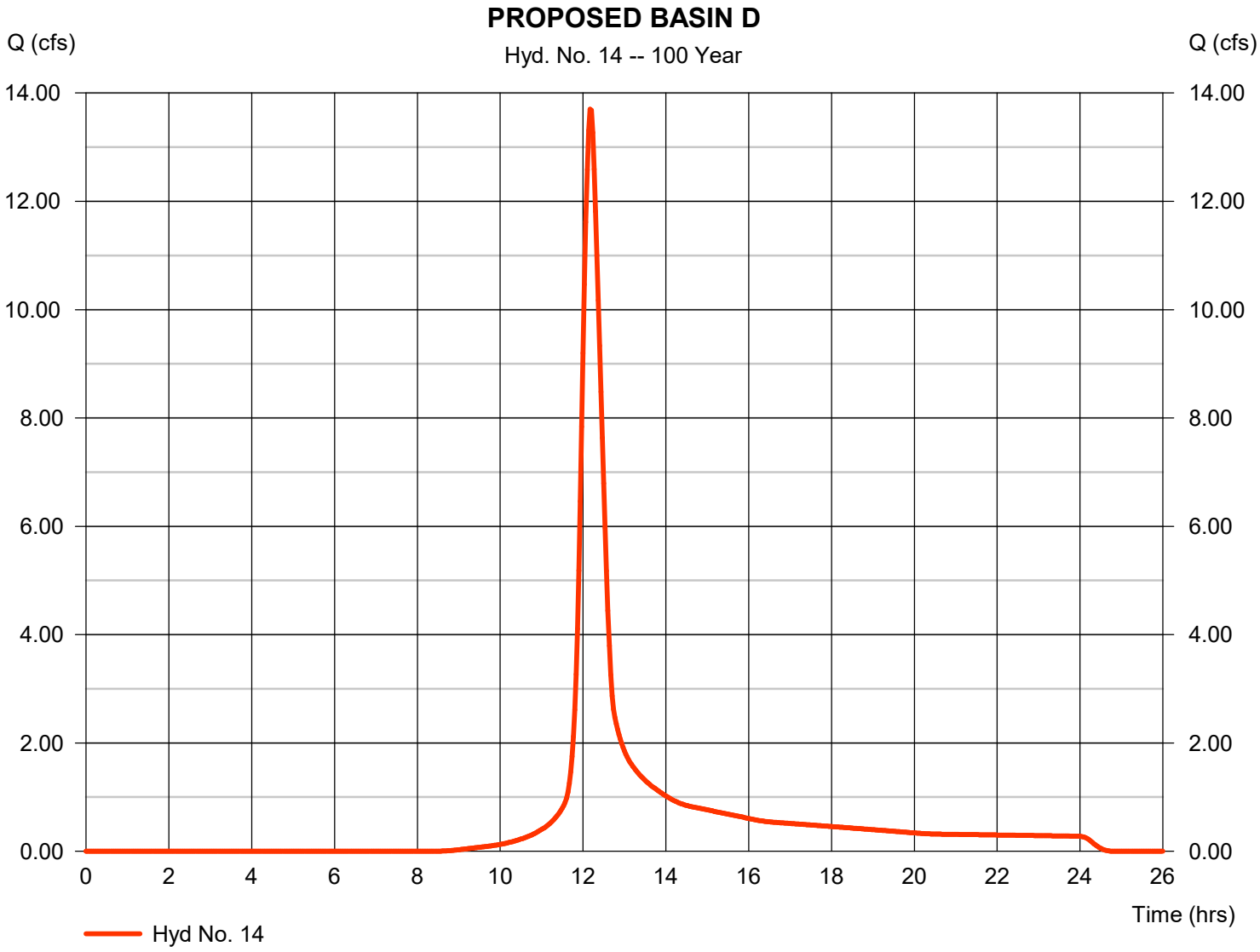


Hydrograph Report

Hyd. No. 14

PROPOSED BASIN D

Hydrograph type	=	SCS Runoff	Peak discharge	=	13.70 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	55,078 cuft
Drainage area	=	4.200 ac	Curve number	=	69
Basin Slope	=	2.4 %	Hydraulic length	=	970 ft
Tc method	=	LAG	Time of conc. (Tc)	=	27.60 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

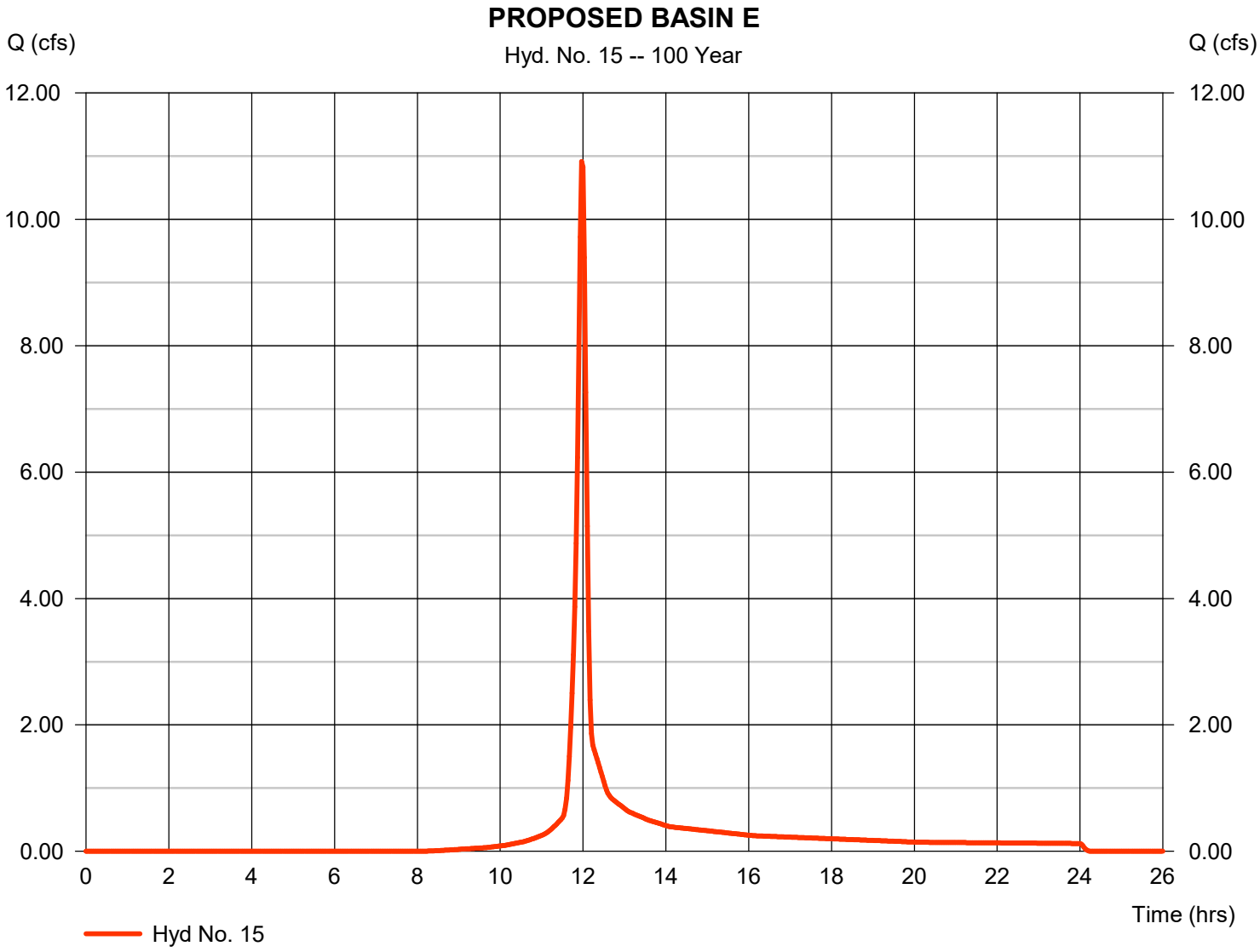


Hydrograph Report

Hyd. No. 15

PROPOSED BASIN E

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.91 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	24,971 cuft
Drainage area	=	1.850 ac	Curve number	=	70
Basin Slope	=	2.1 %	Hydraulic length	=	175 ft
Tc method	=	LAG	Time of conc. (Tc)	=	7.20 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



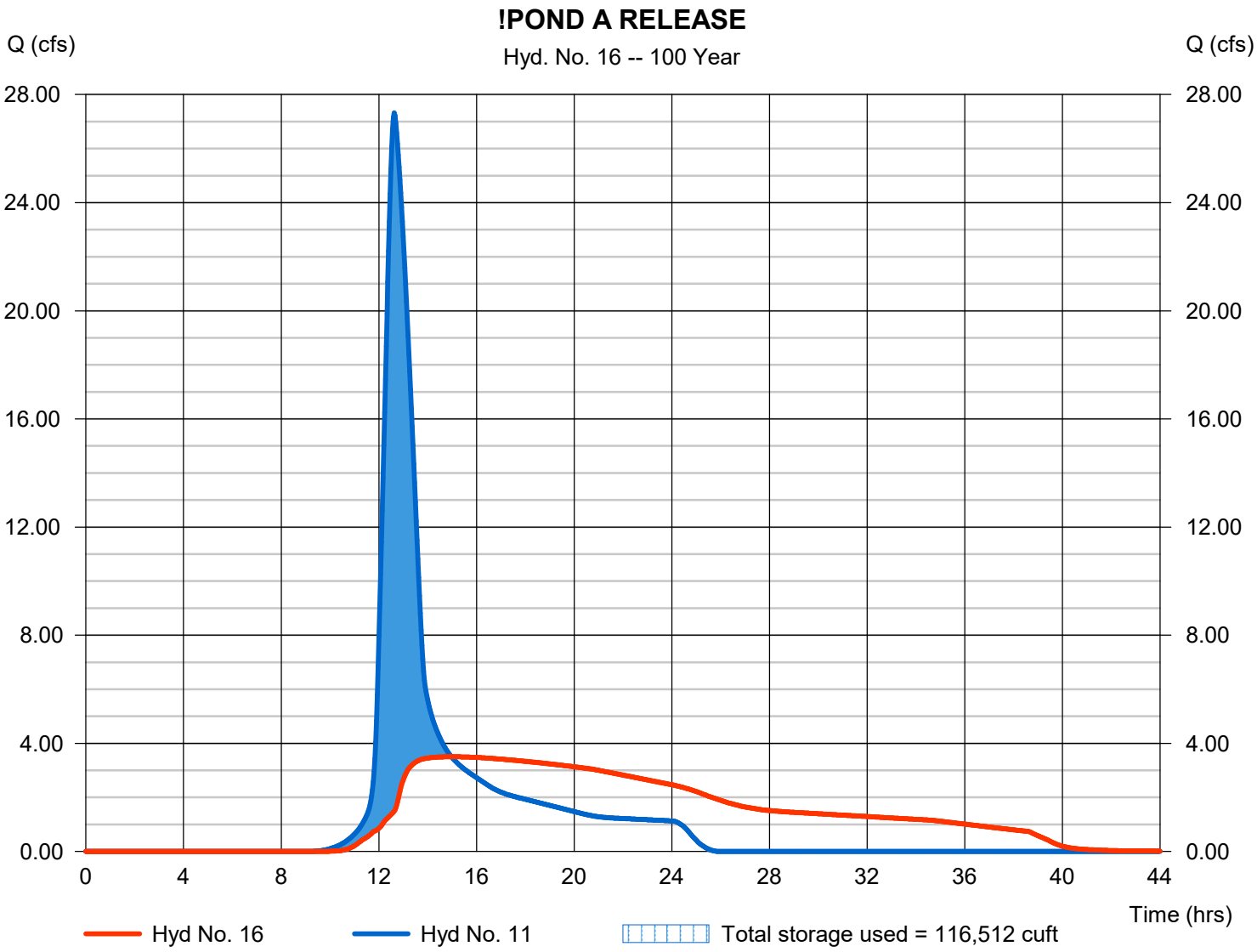
Hydrograph Report

Hyd. No. 16

!POND A RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	3.502 cfs
Storm frequency	=	100 yrs	Time to peak	=	14.97 hrs
Time interval	=	2 min	Hyd. volume	=	209,059 cuft
Inflow hyd. No.	=	11 - PROPOSED BASIN A	Max. Elevation	=	935.42 ft
Reservoir name	=	POND A	Max. Storage	=	116,512 cuft

Storage Indication method used.

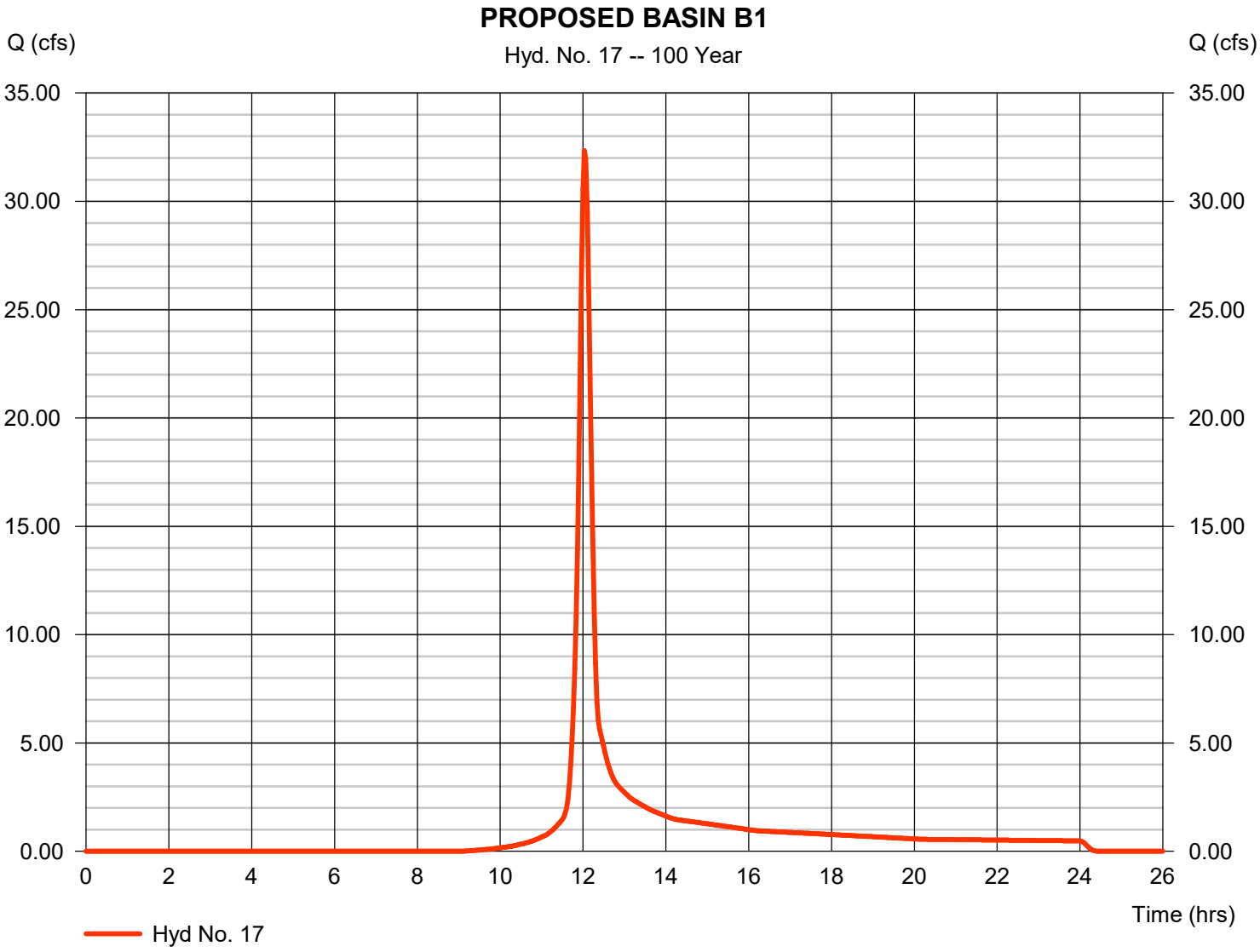


Hydrograph Report

Hyd. No. 17

PROPOSED BASIN B1

Hydrograph type	=	SCS Runoff	Peak discharge	=	32.34 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	91,072 cuft
Drainage area	=	7.800 ac	Curve number	=	66
Basin Slope	=	6.5 %	Hydraulic length	=	760 ft
Tc method	=	LAG	Time of conc. (Tc)	=	14.80 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

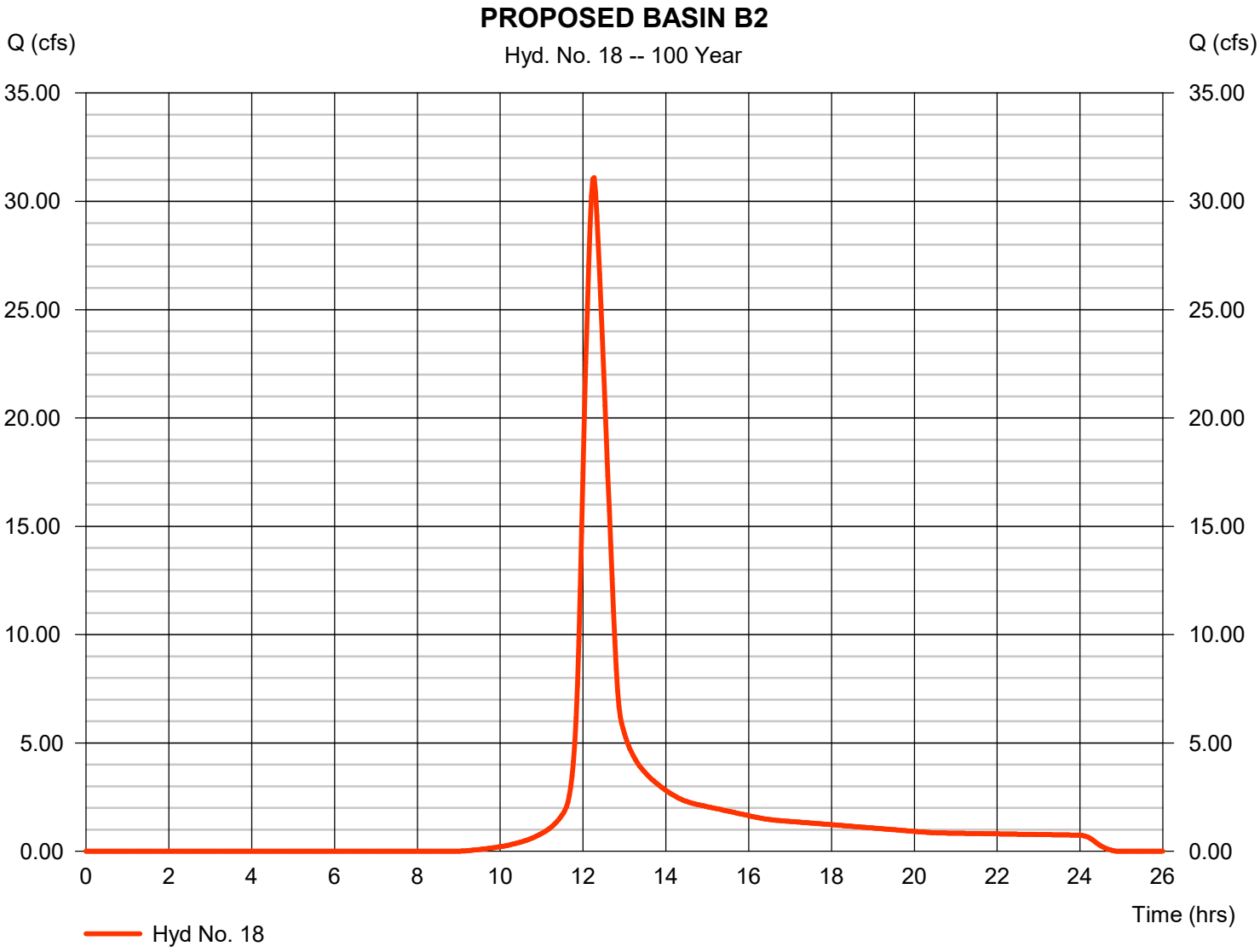


Hydrograph Report

Hyd. No. 18

PROPOSED BASIN B2

Hydrograph type	=	SCS Runoff	Peak discharge	=	31.10 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.27 hrs
Time interval	=	2 min	Hyd. volume	=	142,394 cuft
Drainage area	=	11.660 ac	Curve number	=	67
Basin Slope	=	3.5 %	Hydraulic length	=	1500 ft
Tc method	=	LAG	Time of conc. (Tc)	=	34.00 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

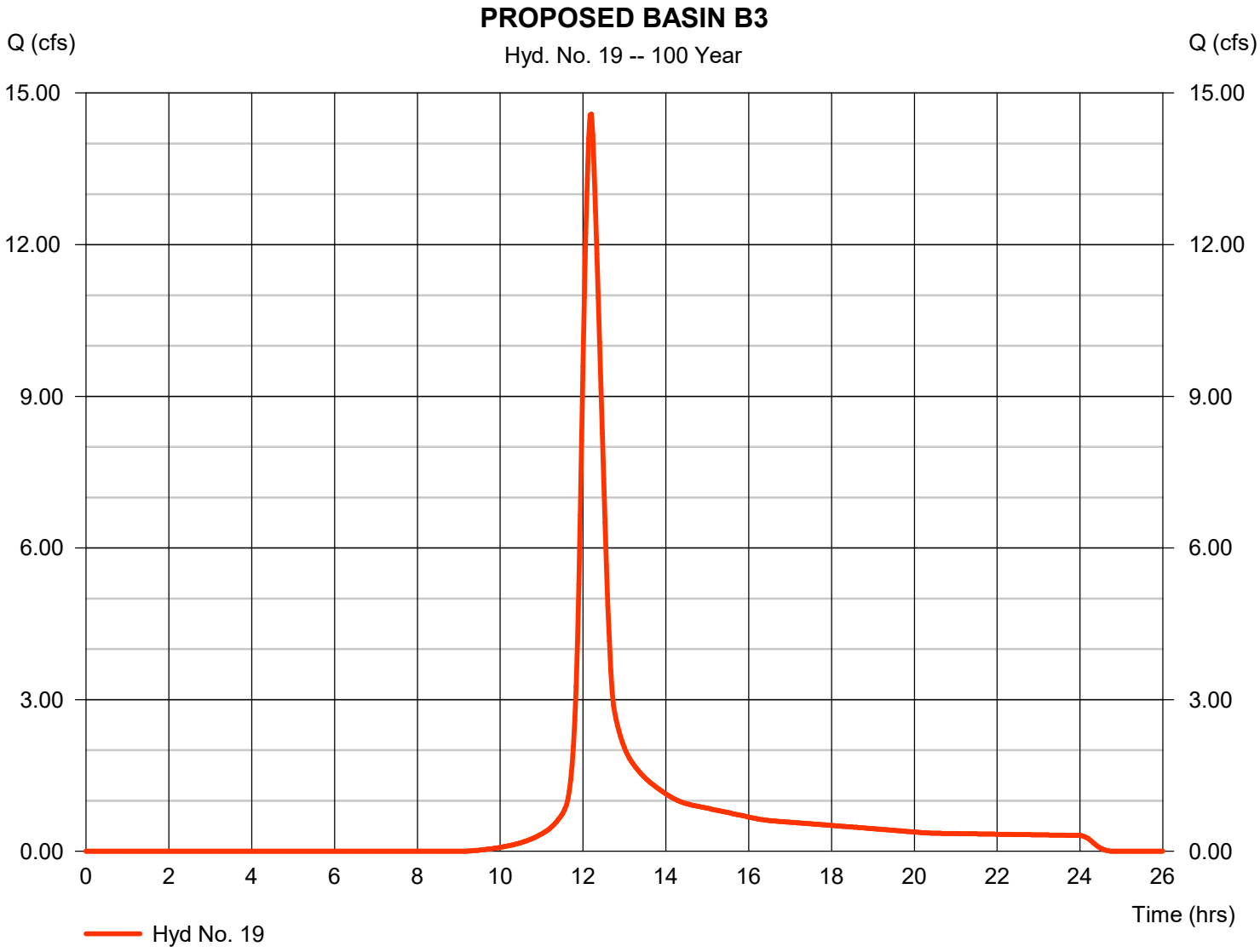


Hydrograph Report

Hyd. No. 19

PROPOSED BASIN B3

Hydrograph type	=	SCS Runoff	Peak discharge	=	14.58 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.20 hrs
Time interval	=	2 min	Hyd. volume	=	59,038 cuft
Drainage area	=	4.930 ac	Curve number	=	66
Basin Slope	=	2.7 %	Hydraulic length	=	950 ft
Tc method	=	LAG	Time of conc. (Tc)	=	27.30 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

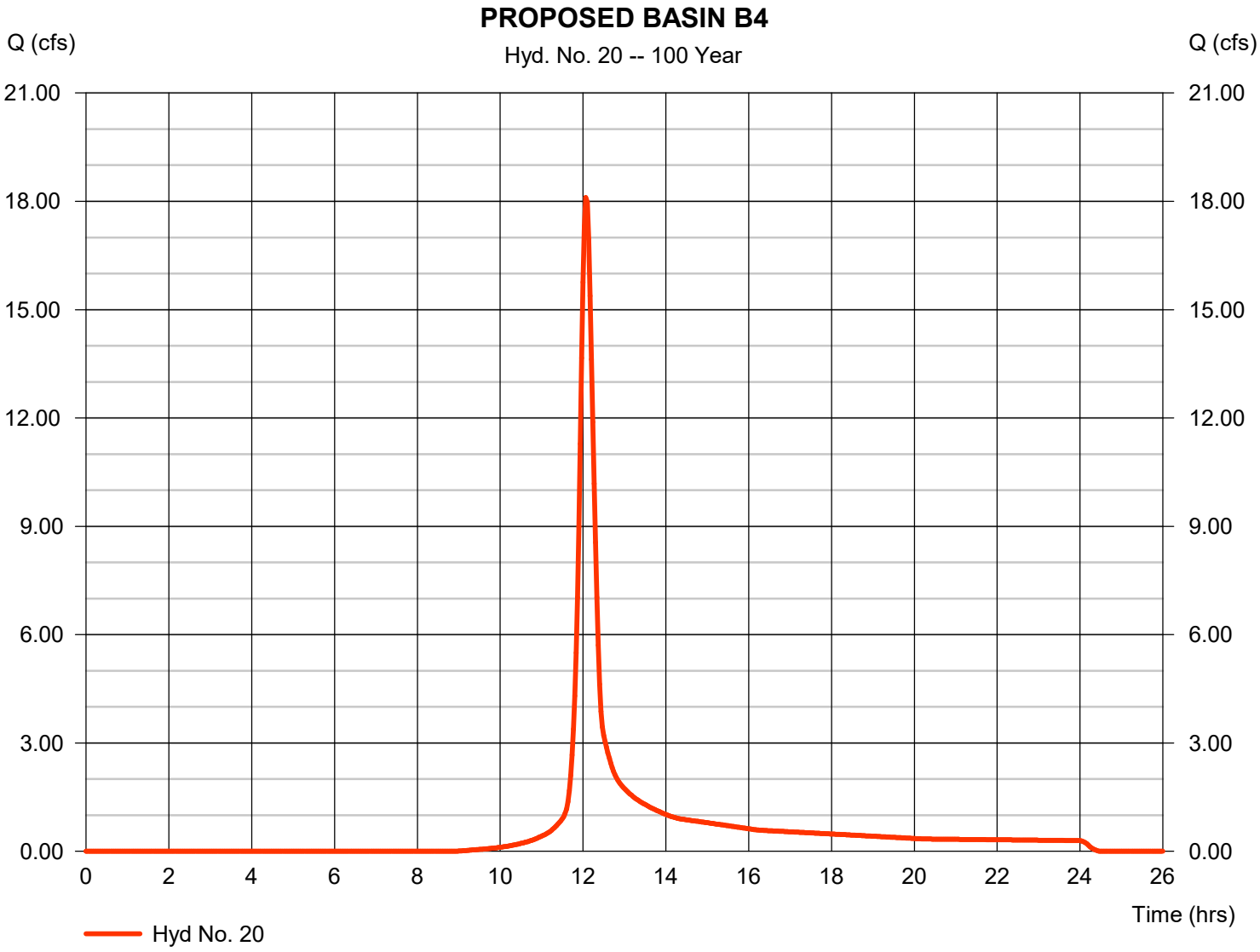


Hydrograph Report

Hyd. No. 20

PROPOSED BASIN B4

Hydrograph type	= SCS Runoff	Peak discharge	= 18.11 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 56,945 cuft
Drainage area	= 4.610 ac	Curve number	= 67
Basin Slope	= 4.1 %	Hydraulic length	= 780 ft
Tc method	= LAG	Time of conc. (Tc)	= 18.60 min
Total precip.	= 7.12 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

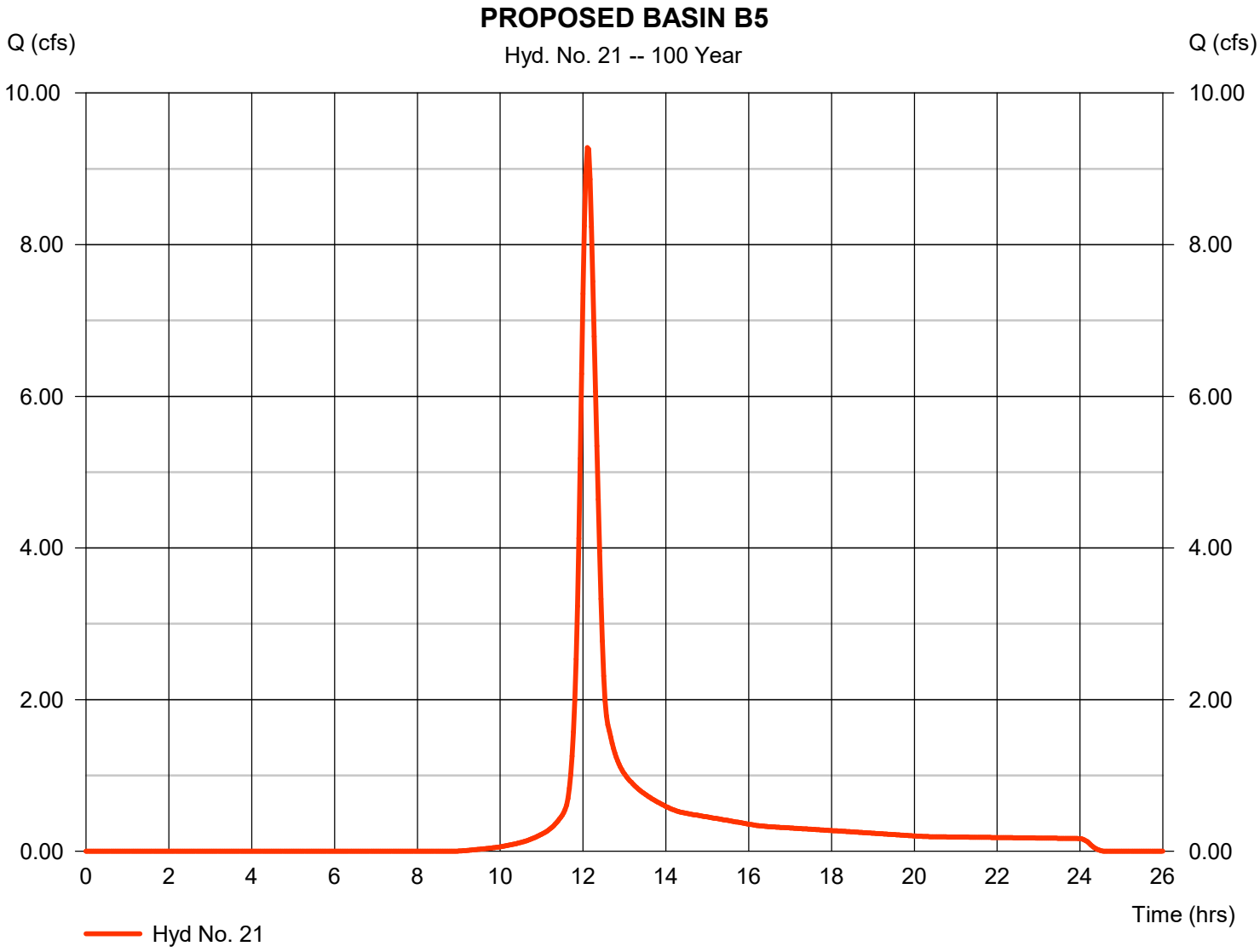


Hydrograph Report

Hyd. No. 21

PROPOSED BASIN B5

Hydrograph type	= SCS Runoff	Peak discharge	= 9.280 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 32,313 cuft
Drainage area	= 2.570 ac	Curve number	= 67
Basin Slope	= 2.5 %	Hydraulic length	= 750 ft
Tc method	= LAG	Time of conc. (Tc)	= 23.10 min
Total precip.	= 7.12 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

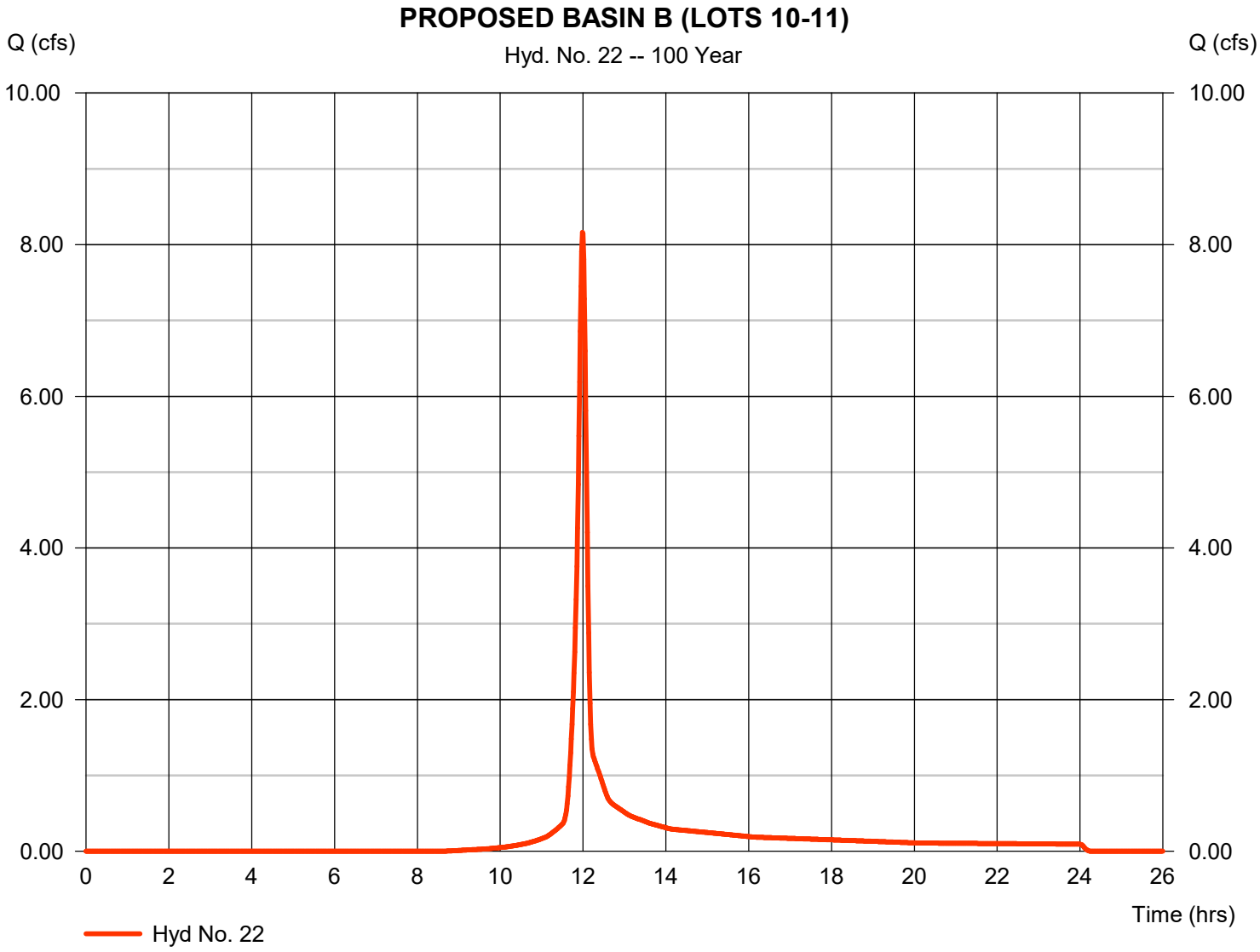


Hydrograph Report

Hyd. No. 22

PROPOSED BASIN B (LOTS 10-11)

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.162 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.98 hrs
Time interval	=	1 min	Hyd. volume	=	18,462 cuft
Drainage area	=	1.450 ac	Curve number	=	68
Basin Slope	=	2.0 %	Hydraulic length	=	100 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

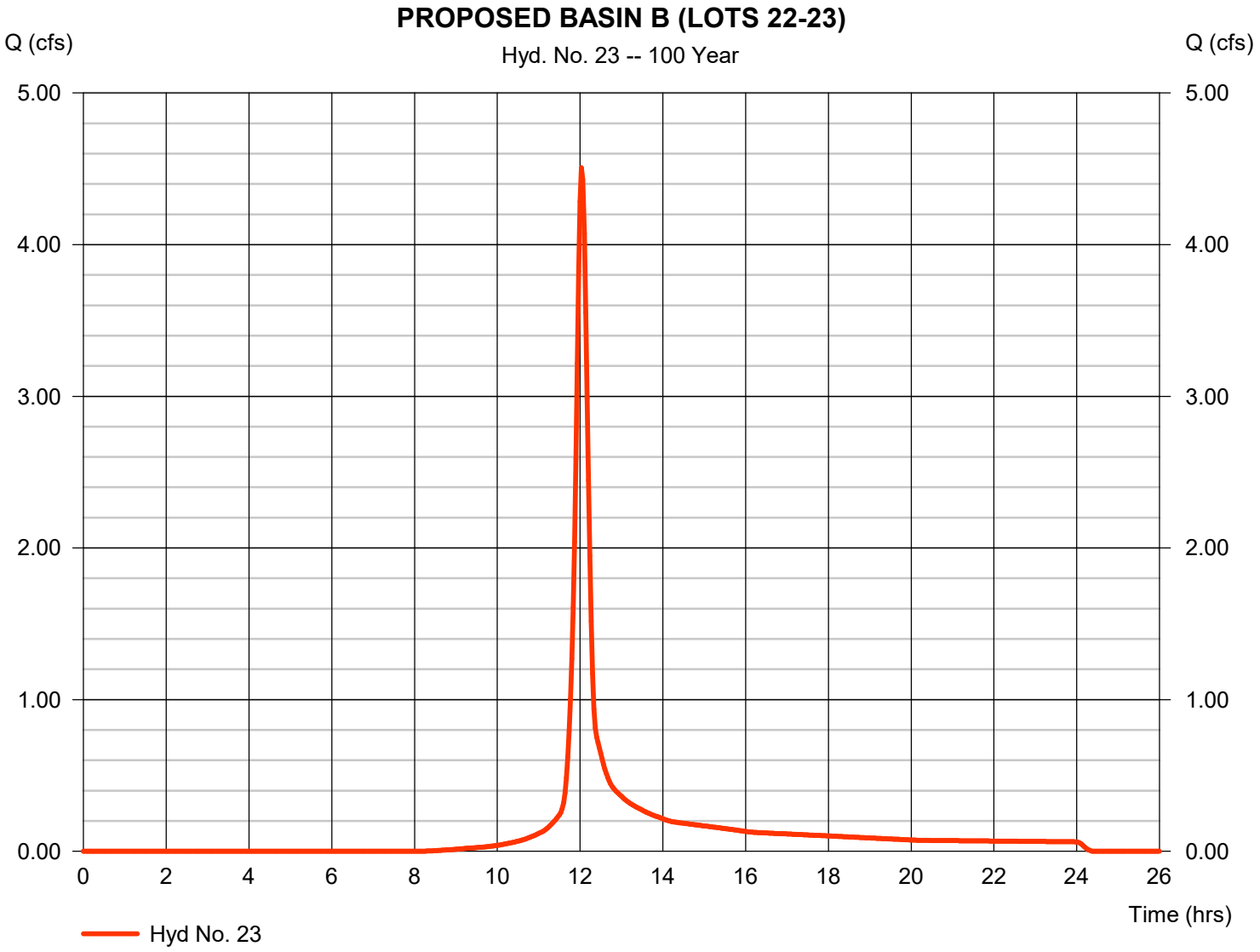


Hydrograph Report

Hyd. No. 23

PROPOSED BASIN B (LOTS 22-23)

Hydrograph type	= SCS Runoff	Peak discharge	= 4.506 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 12,634 cuft
Drainage area	= 0.960 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 7.12 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

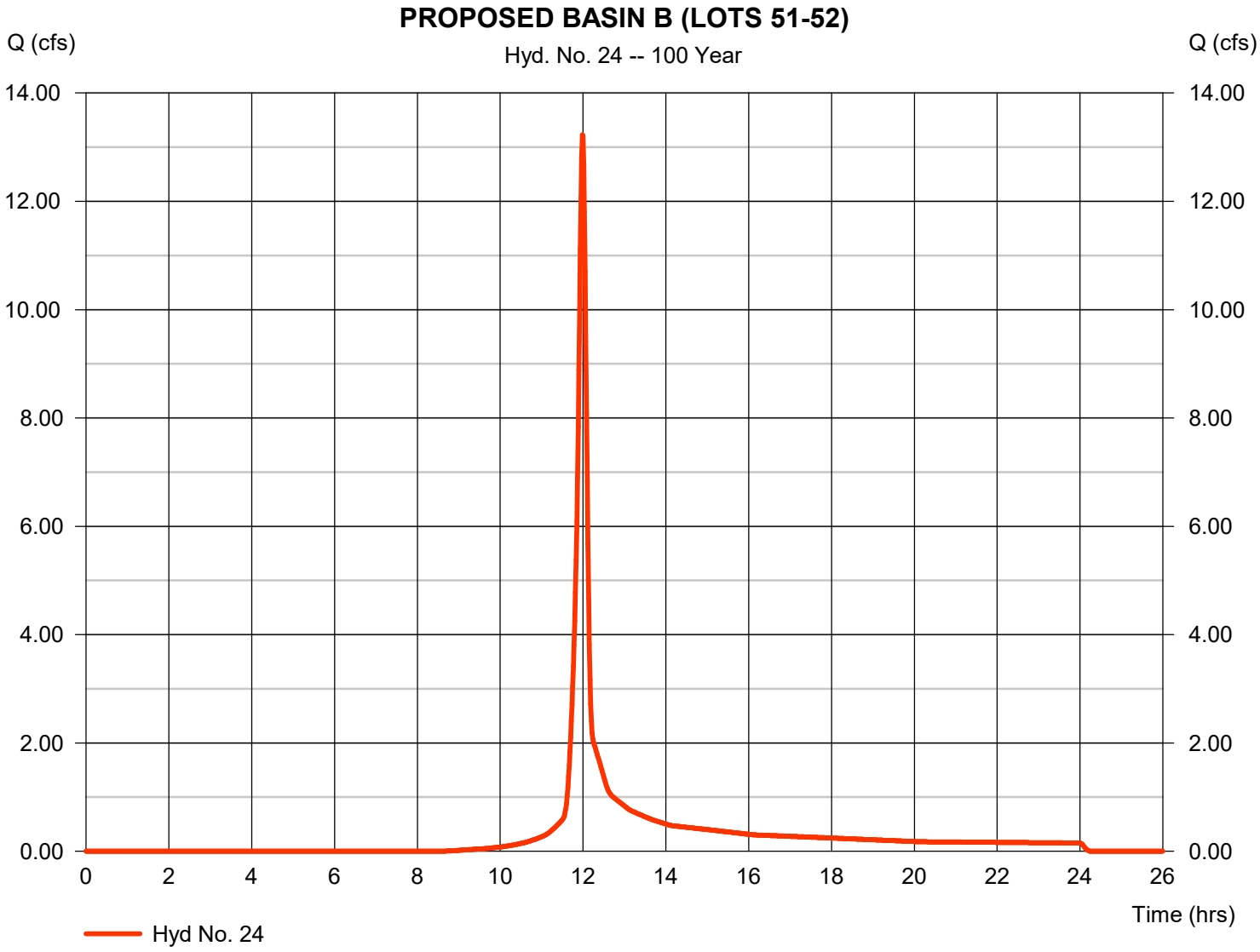


Hydrograph Report

Hyd. No. 24

PROPOSED BASIN B (LOTS 51-52)

Hydrograph type	=	SCS Runoff	Peak discharge	=	13.23 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.98 hrs
Time interval	=	1 min	Hyd. volume	=	29,921 cuft
Drainage area	=	2.350 ac	Curve number	=	68
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

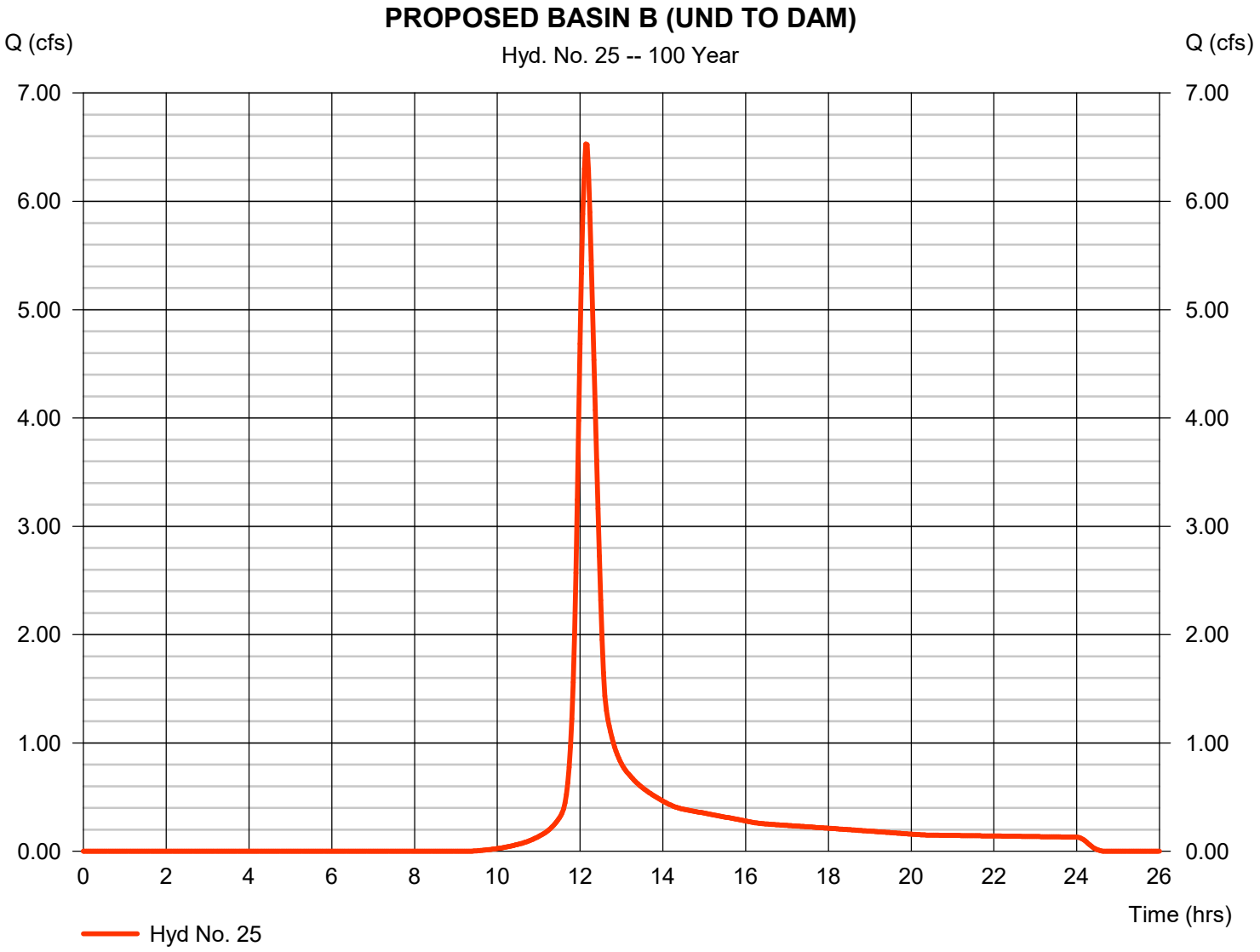


Hydrograph Report

Hyd. No. 25

PROPOSED BASIN B (UND TO DAM)

Hydrograph type	= SCS Runoff	Peak discharge	= 6.529 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 24,322 cuft
Drainage area	= 2.130 ac	Curve number	= 65
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 25.00 min
Total precip.	= 7.12 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



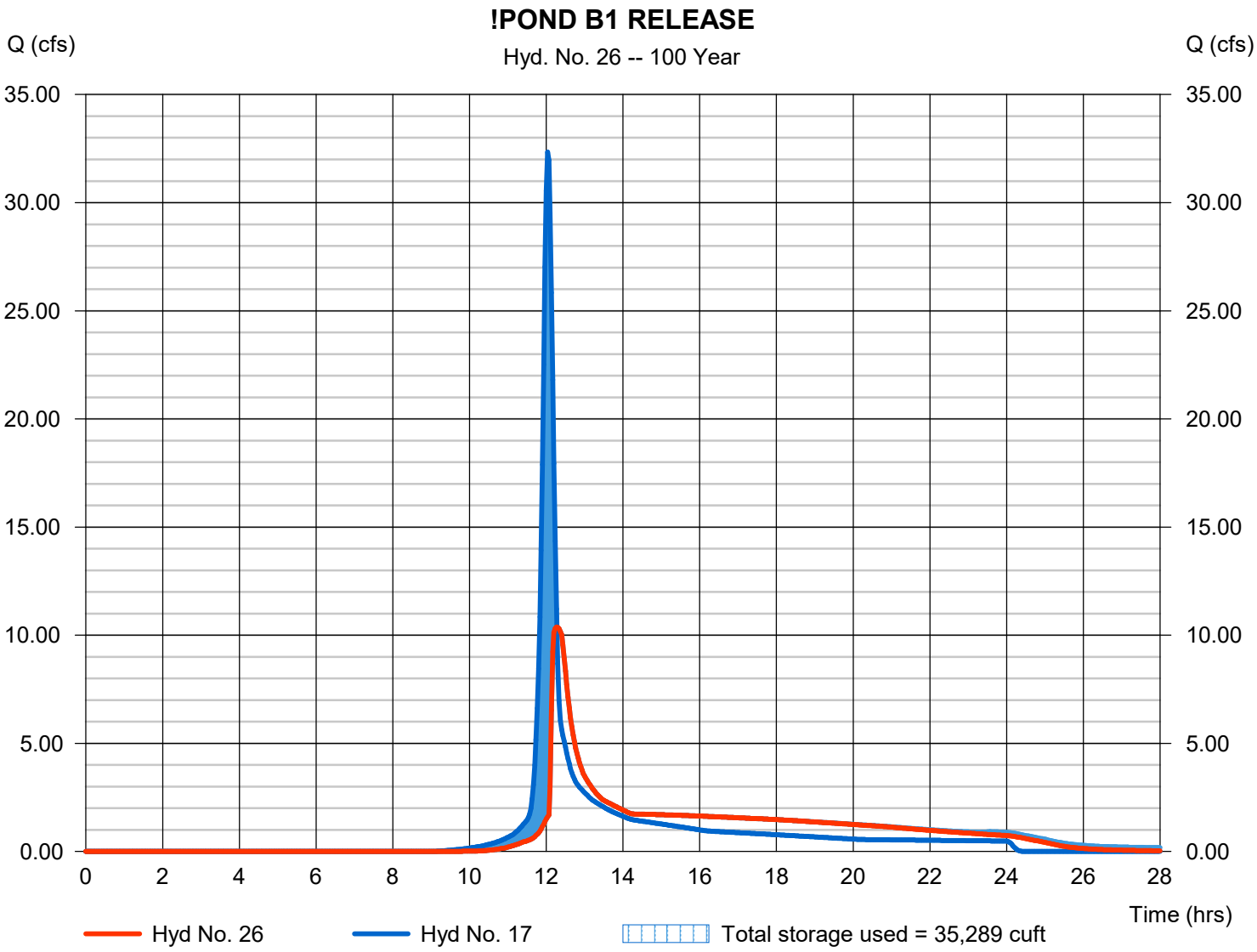
Hydrograph Report

Hyd. No. 26

!POND B1 RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	10.38 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.27 hrs
Time interval	=	2 min	Hyd. volume	=	86,153 cuft
Inflow hyd. No.	=	17 - PROPOSED BASIN B1	Max. Elevation	=	938.74 ft
Reservoir name	=	POND B1	Max. Storage	=	35,289 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



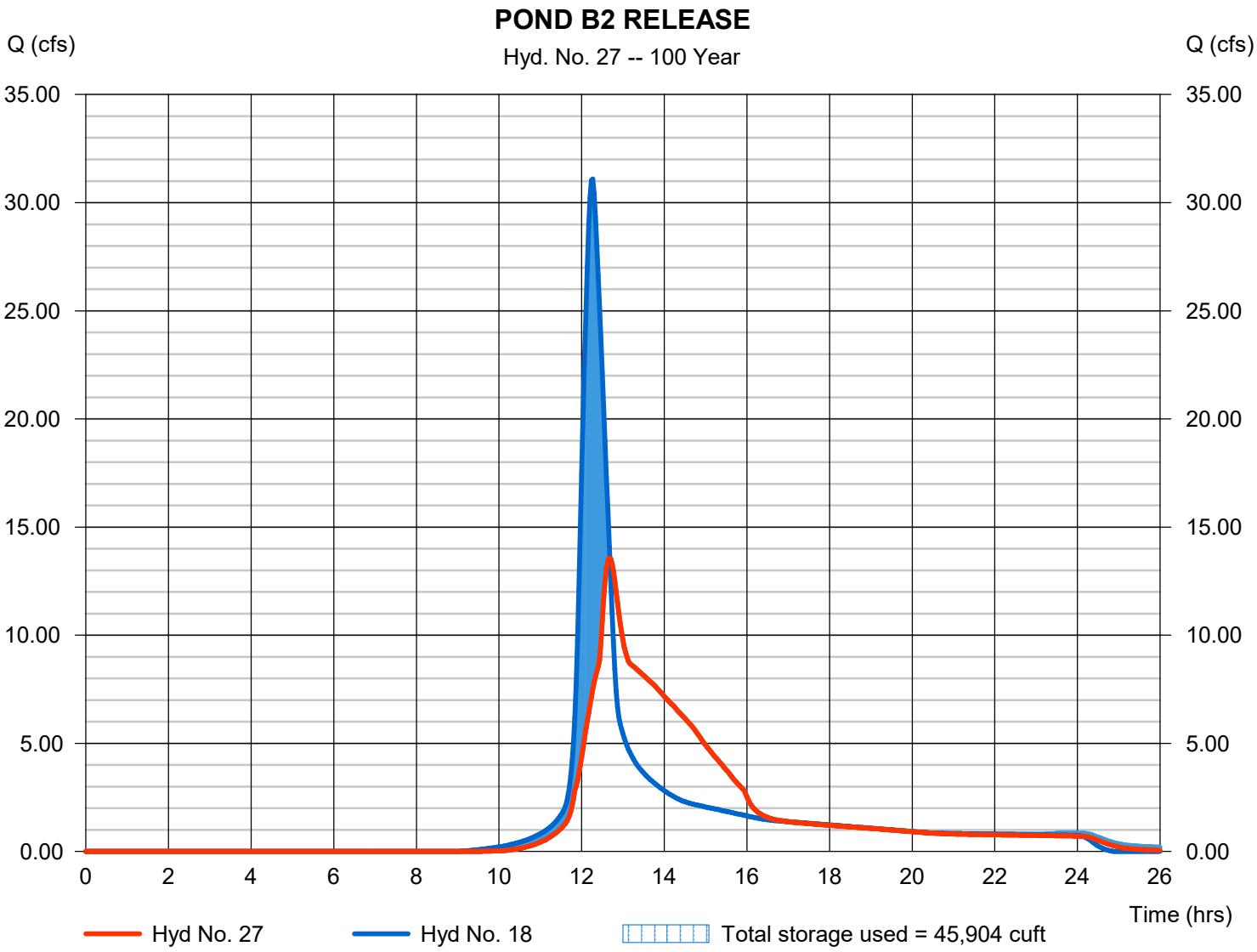
Hydrograph Report

Hyd. No. 27

POND B2 RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	13.57 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.67 hrs
Time interval	=	2 min	Hyd. volume	=	137,801 cuft
Inflow hyd. No.	=	18 - PROPOSED BASIN B2	Max. Elevation	=	941.89 ft
Reservoir name	=	POND B2	Max. Storage	=	45,904 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

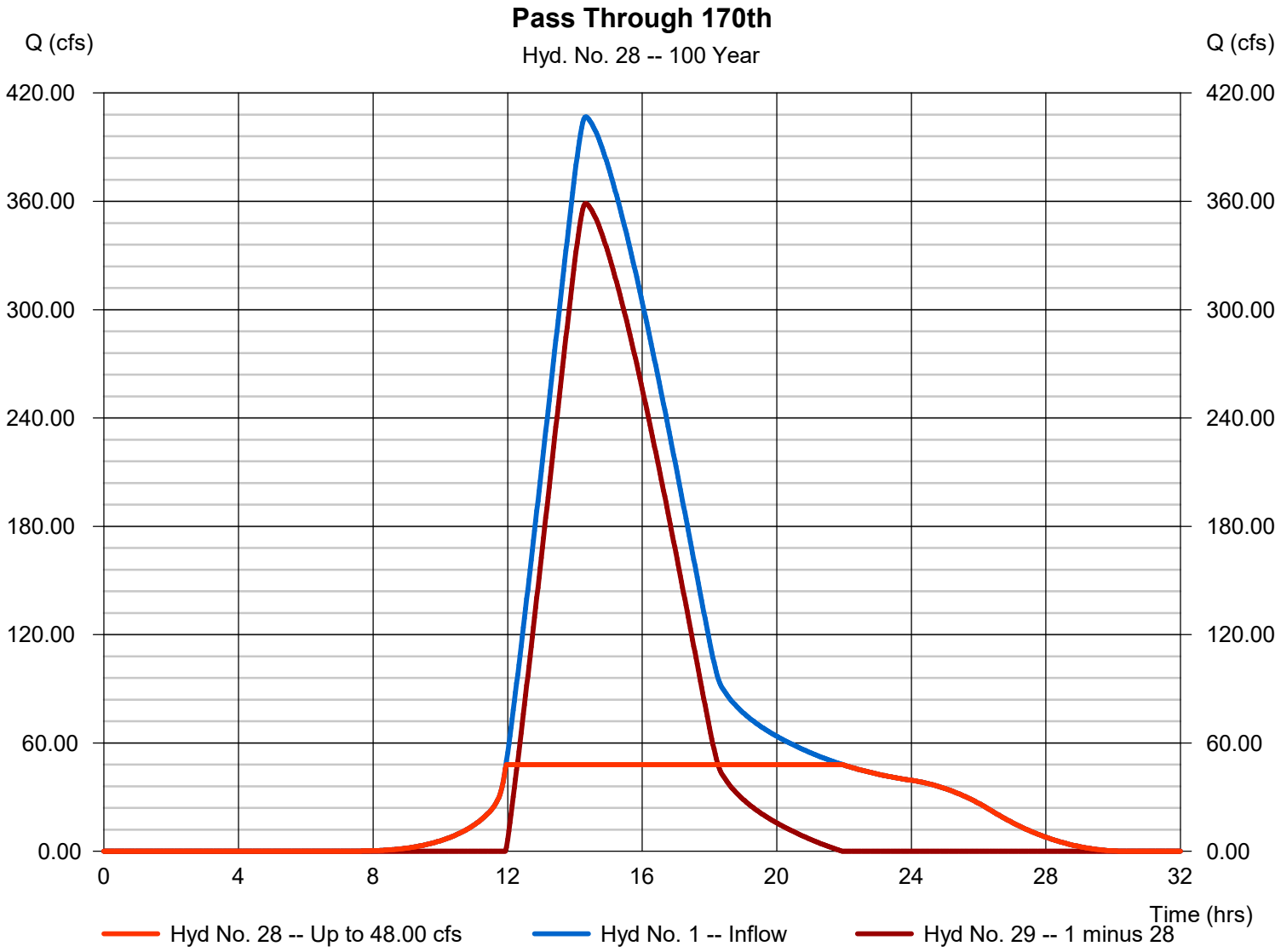


Hydrograph Report

Hyd. No. 28

Pass Through 170th

Hydrograph type	= Diversion1	Peak discharge	= 48.00 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 2,566,277 cuft
Inflow hydrograph	= 1 - Off-Site Basin B (upper)	2nd diverted hyd.	= 29
Diversion method	= Constant Q	Constant Q	= 48.00 cfs

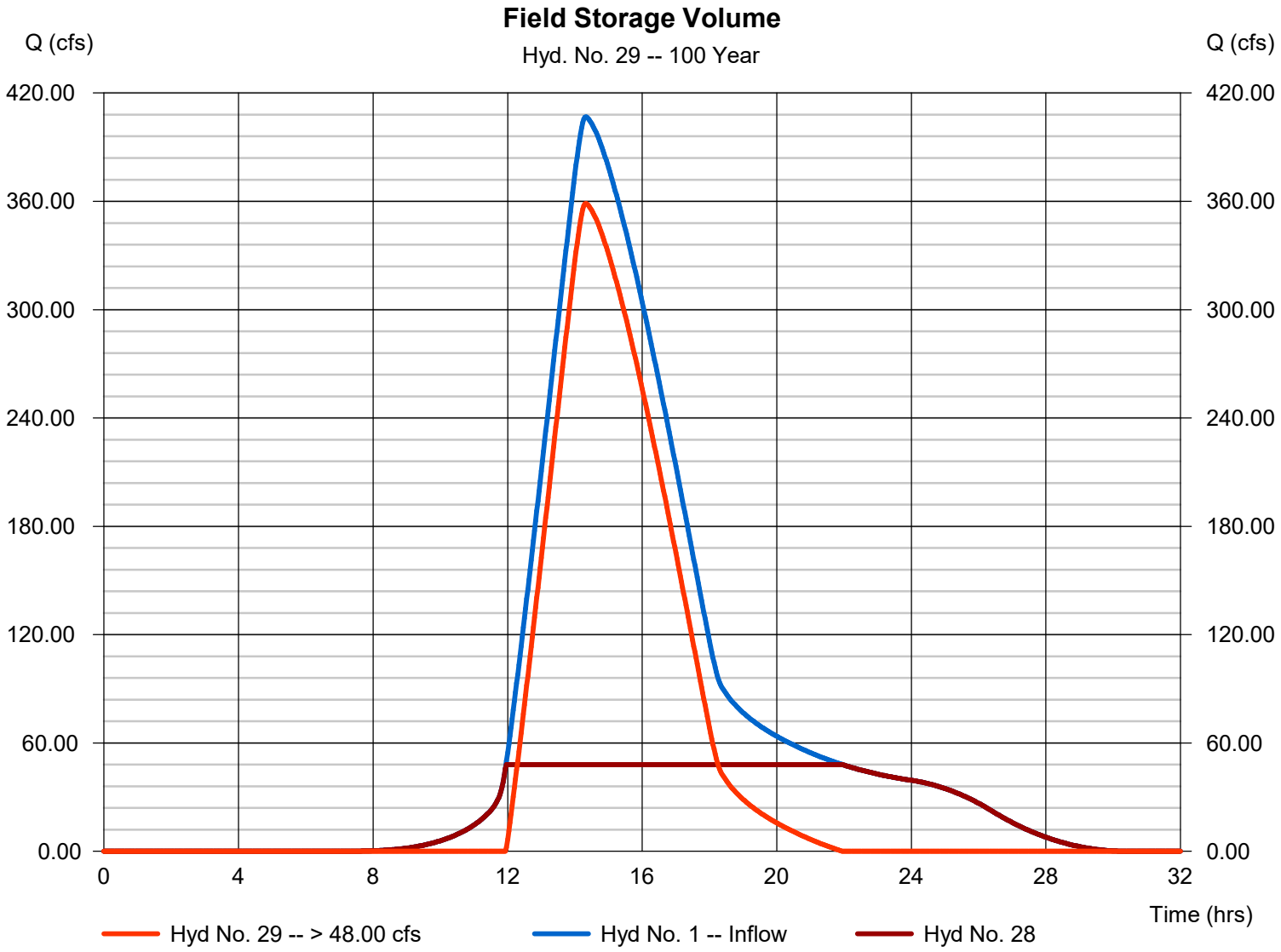


Hydrograph Report

Hyd. No. 29

Field Storage Volume

Hydrograph type	= Diversion2	Peak discharge	= 358.78 cfs
Storm frequency	= 100 yrs	Time to peak	= 14.33 hrs
Time interval	= 2 min	Hyd. volume	= 4,956,494 cuft
Inflow hydrograph	= 1 - Off-Site Basin B (upper)	2nd diverted hyd.	= 28
Diversion method	= Constant Q	Constant Q	= 48.00 cfs



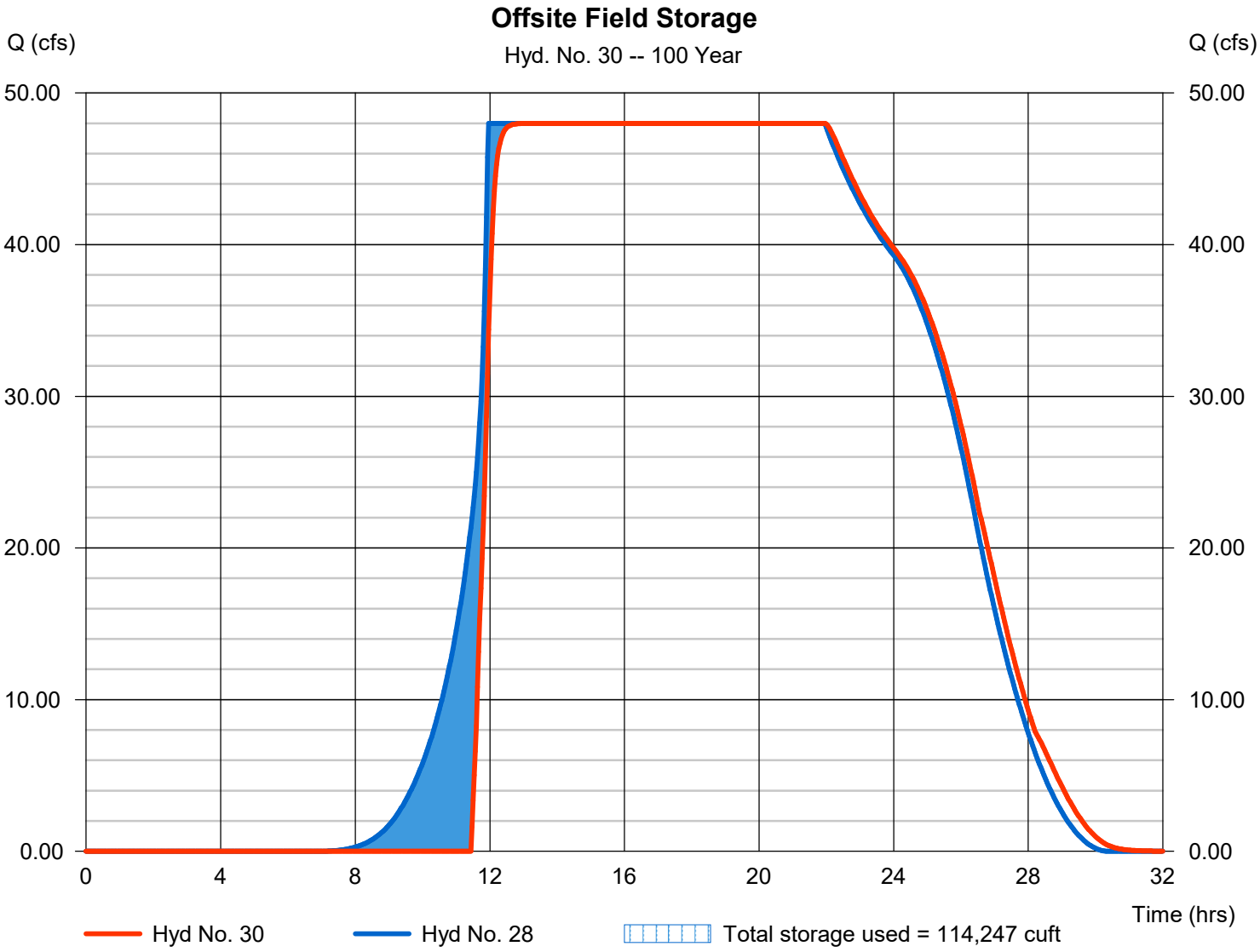
Hydrograph Report

Hyd. No. 30

Offsite Field Storage

Hydrograph type	=	Reservoir	Peak discharge	=	48.00 cfs
Storm frequency	=	100 yrs	Time to peak	=	13.73 hrs
Time interval	=	2 min	Hyd. volume	=	2,487,752 cuft
Inflow hyd. No.	=	28 - Pass Through 170th	Max. Elevation	=	957.83 ft
Reservoir name	=	Offsite Field Storage UPPER	Max. Storage	=	114,247 cuft

Storage Indication method used.

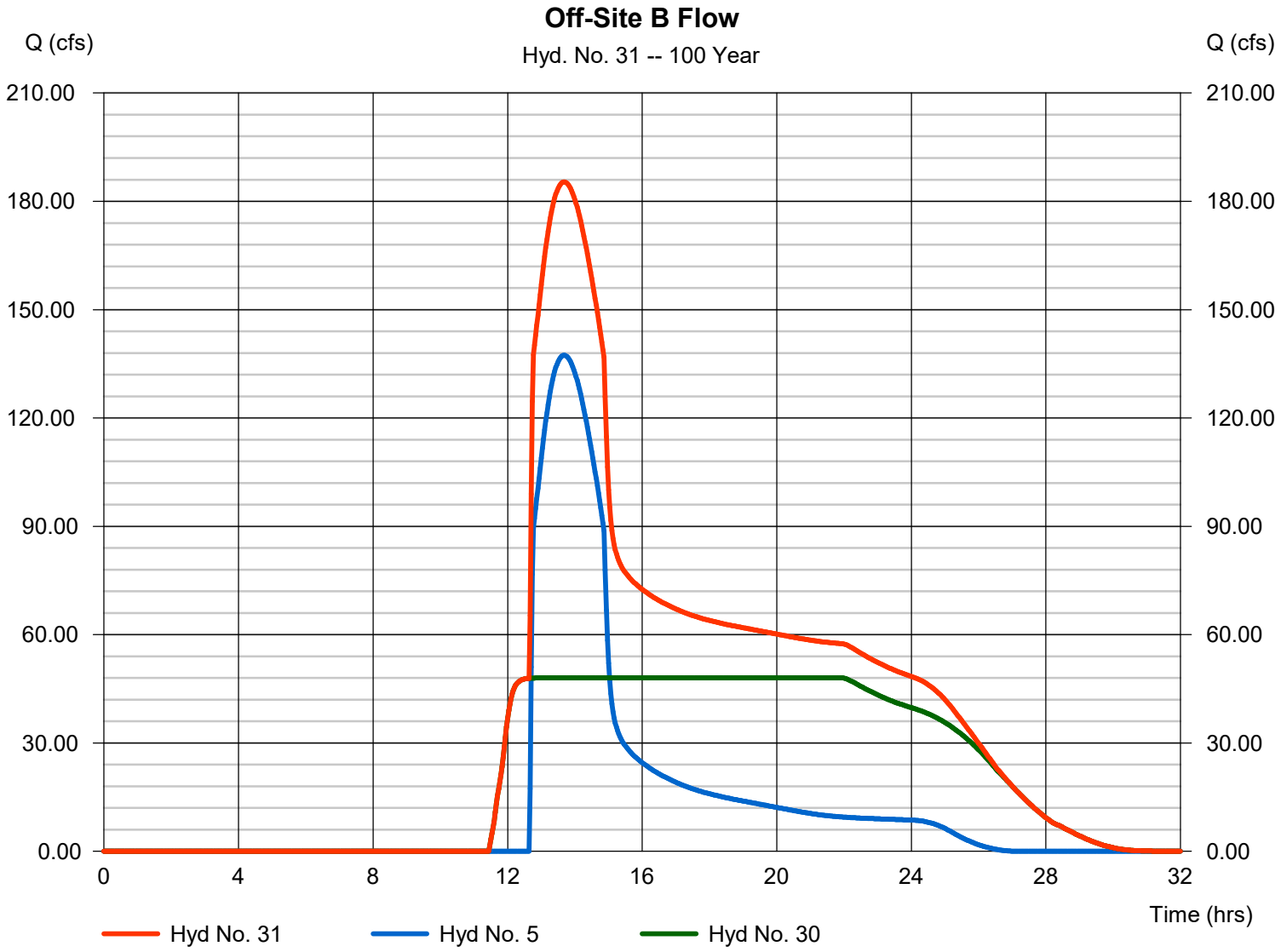


Hydrograph Report

Hyd. No. 31

Off-Site B Flow

Hydrograph type	= Combine	Peak discharge	= 185.35 cfs
Storm frequency	= 100 yrs	Time to peak	= 13.67 hrs
Time interval	= 2 min	Hyd. volume	= 3,988,059 cuft
Inflow hyds.	= 5, 30	Contrib. drain. area	= 0.000 ac



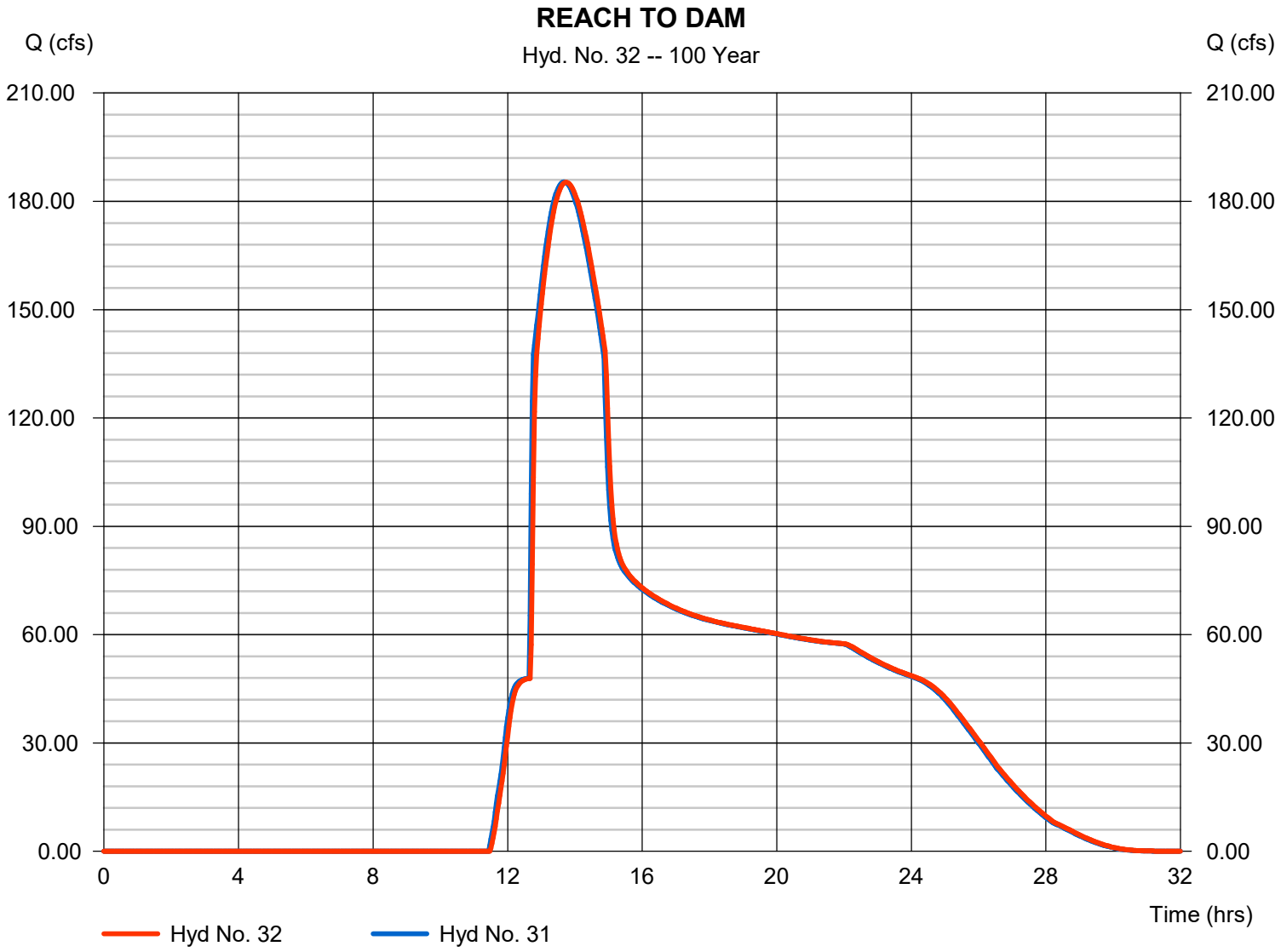
Hydrograph Report

Hyd. No. 32

REACH TO DAM

Hydrograph type	=	Reach	Peak discharge	=	185.26 cfs
Storm frequency	=	100 yrs	Time to peak	=	13.73 hrs
Time interval	=	2 min	Hyd. volume	=	3,988,046 cuft
Inflow hyd. No.	=	31 - Off-Site B Flow	Section type	=	Trapezoidal
Reach length	=	1000.0 ft	Channel slope	=	1.0 %
Manning's n	=	0.025	Bottom width	=	20.0 ft
Side slope	=	4.0:1	Max. depth	=	5.0 ft
Rating curve x	=	0.808	Rating curve m	=	1.438
Ave. velocity	=	4.23 ft/s	Routing coeff.	=	0.5344

Modified Att-Kin routing method used.



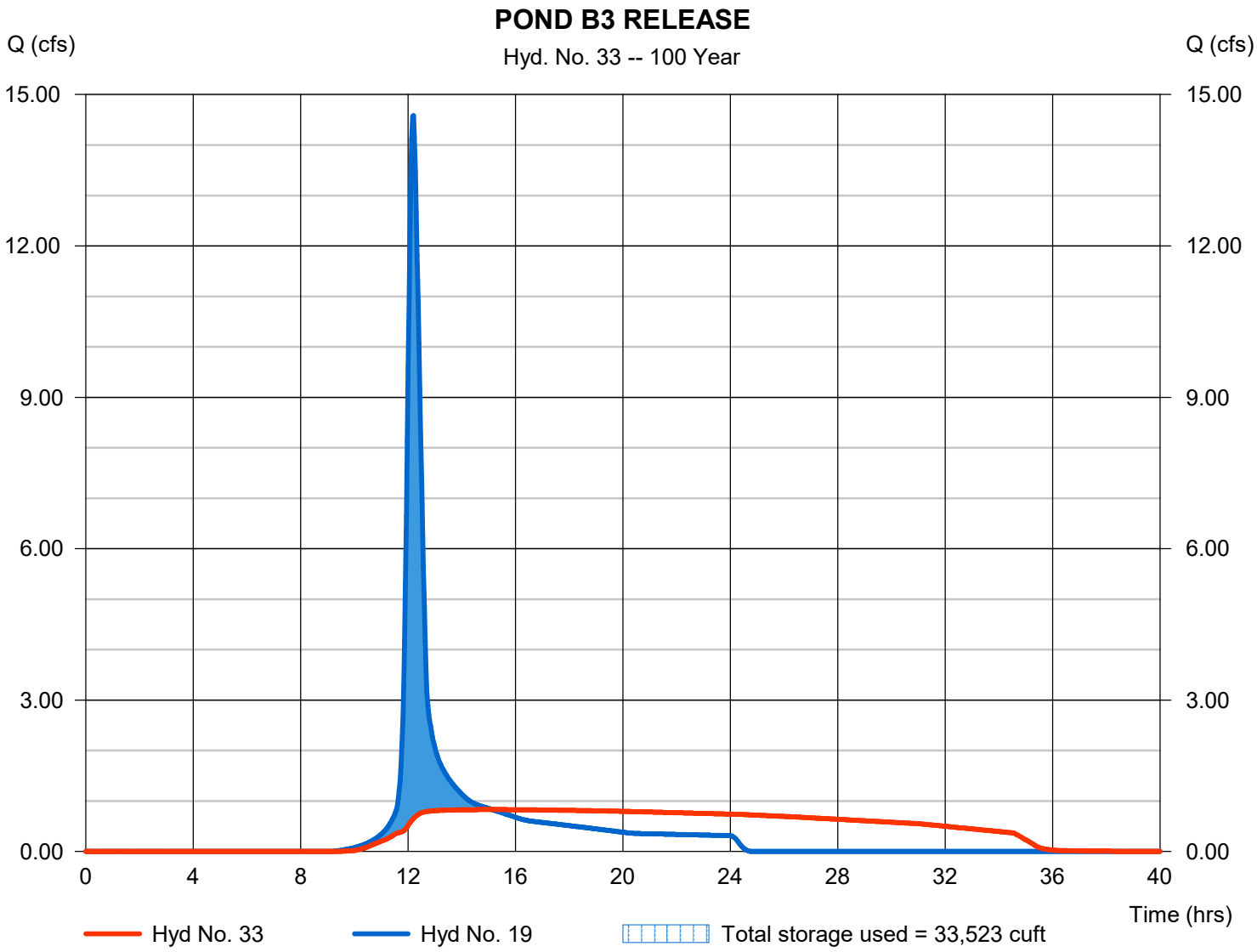
Hydrograph Report

Hyd. No. 33

POND B3 RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	0.829 cfs
Storm frequency	=	100 yrs	Time to peak	=	15.13 hrs
Time interval	=	2 min	Hyd. volume	=	59,034 cuft
Inflow hyd. No.	=	19 - PROPOSED BASIN B3	Max. Elevation	=	941.26 ft
Reservoir name	=	POND B3	Max. Storage	=	33,523 cuft

Storage Indication method used.

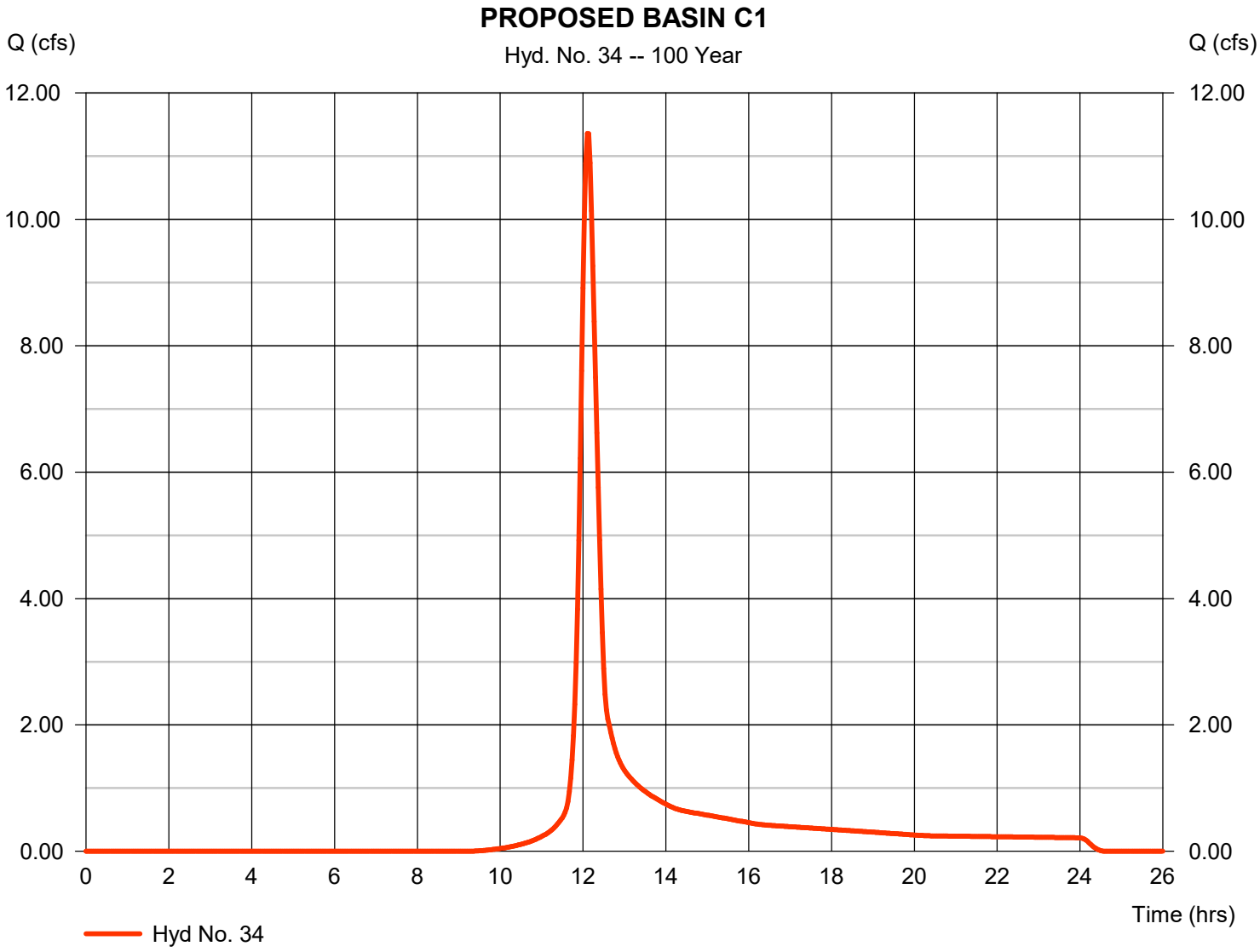


Hydrograph Report

Hyd. No. 34

PROPOSED BASIN C1

Hydrograph type	=	SCS Runoff	Peak discharge	=	11.36 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	39,791 cuft
Drainage area	=	3.370 ac	Curve number	=	65
Basin Slope	=	2.3 %	Hydraulic length	=	630 ft
Tc method	=	LAG	Time of conc. (Tc)	=	22.00 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

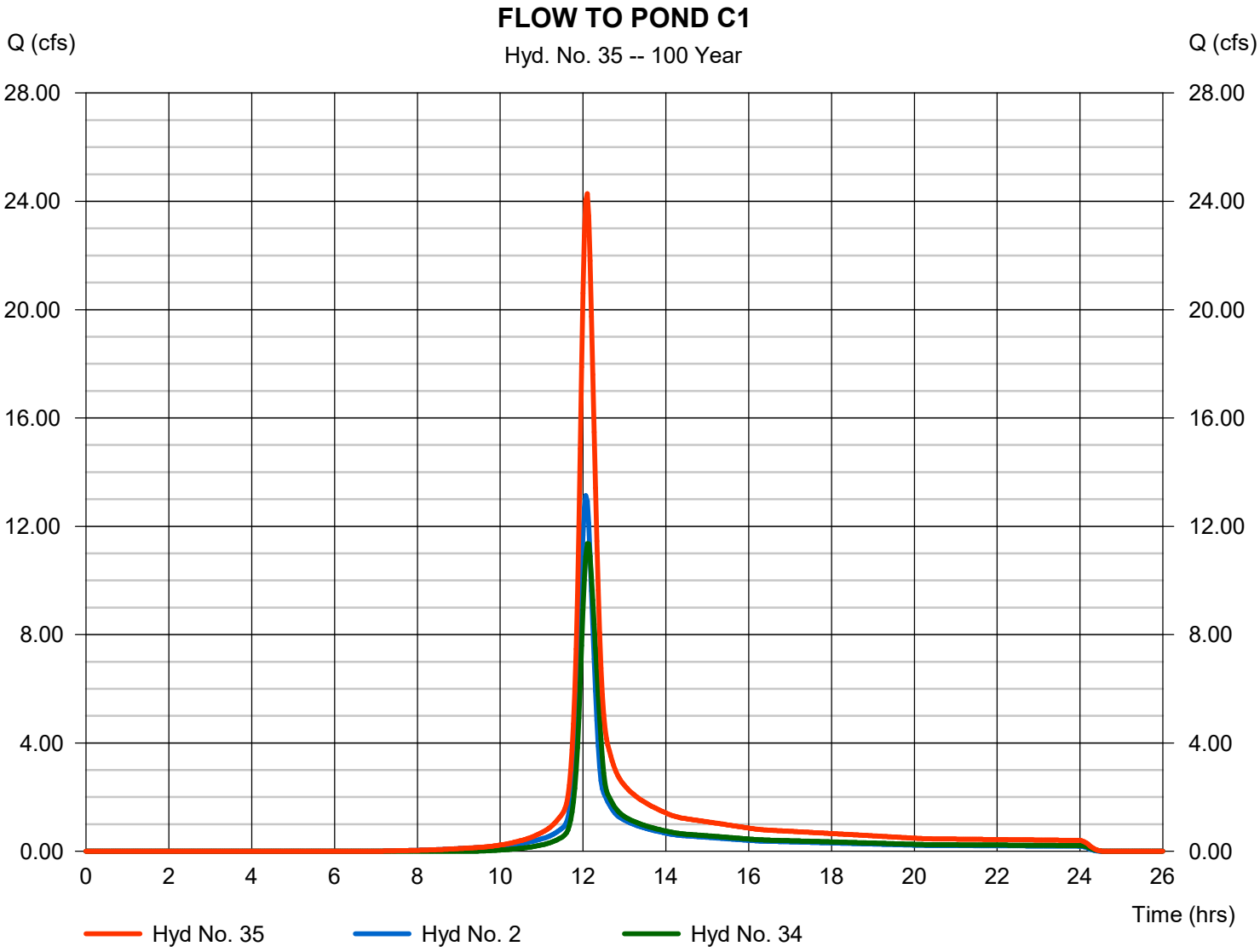


Hydrograph Report

Hyd. No. 35

FLOW TO POND C1

Hydrograph type	= Combine	Peak discharge	= 24.28 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 80,879 cuft
Inflow hyds.	= 2, 34	Contrib. drain. area	= 6.030 ac

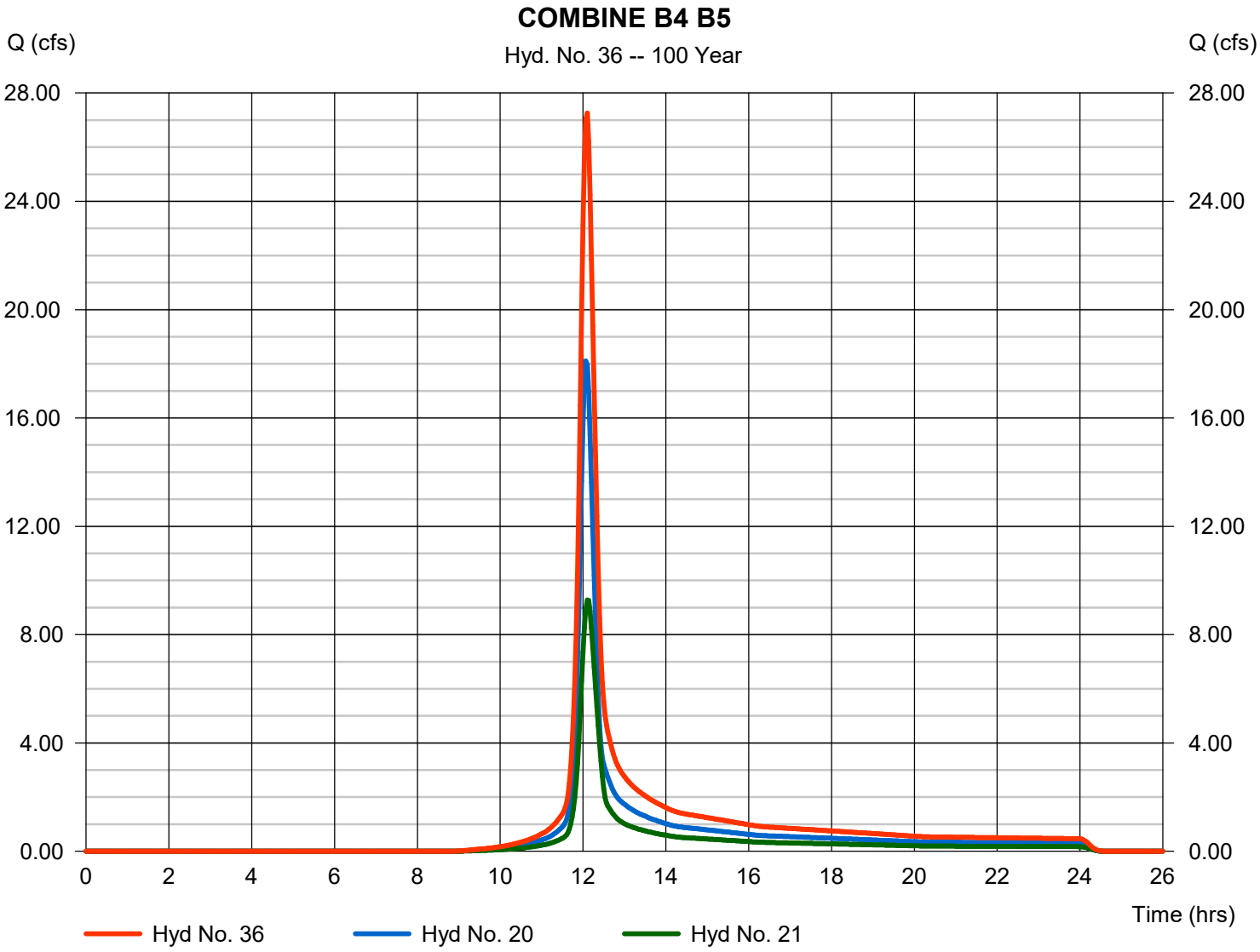


Hydrograph Report

Hyd. No. 36

COMBINE B4 B5

Hydrograph type	= Combine	Peak discharge	= 27.26 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 89,258 cuft
Inflow hyds.	= 20, 21	Contrib. drain. area	= 7.180 ac



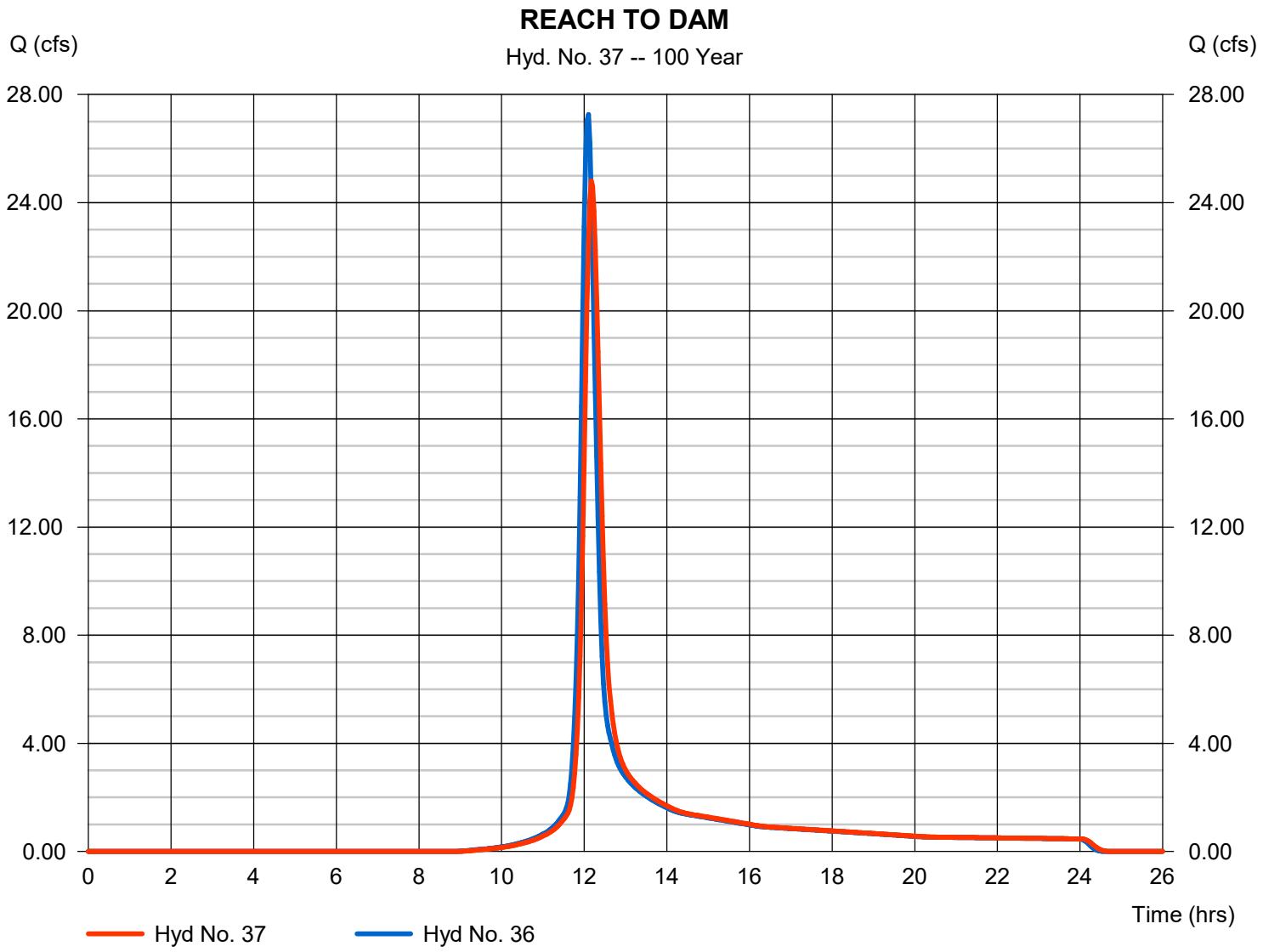
Hydrograph Report

Hyd. No. 37

REACH TO DAM

Hydrograph type	=	Reach	Peak discharge	=	24.81 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	89,255 cuft
Inflow hyd. No.	=	36 - COMBINE B4 B5	Section type	=	Trapezoidal
Reach length	=	1000.0 ft	Channel slope	=	1.0 %
Manning's n	=	0.025	Bottom width	=	20.0 ft
Side slope	=	4.0:1	Max. depth	=	5.0 ft
Rating curve x	=	0.808	Rating curve m	=	1.438
Ave. velocity	=	2.36 ft/s	Routing coeff.	=	0.3381

Modified Att-Kin routing method used.

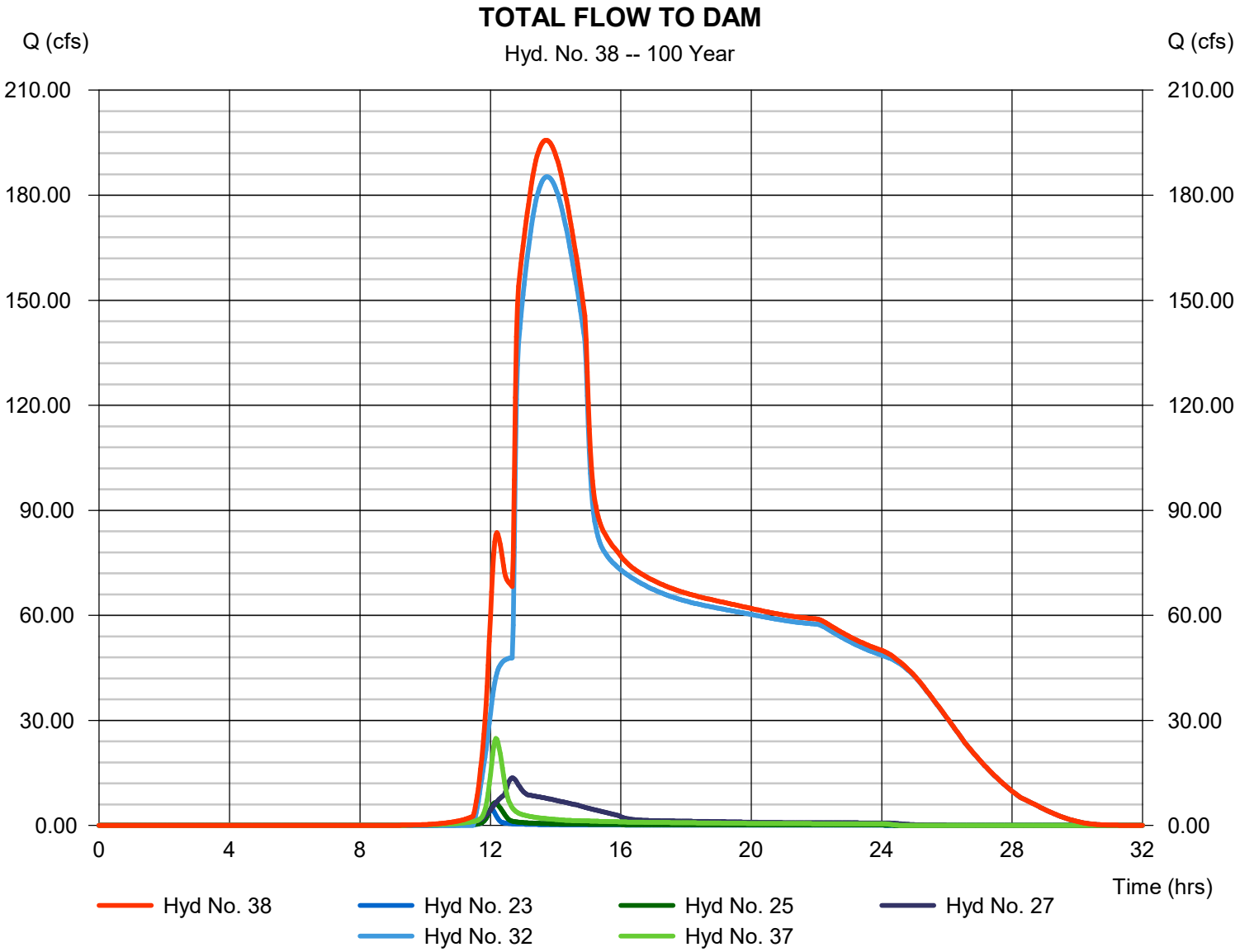


Hydrograph Report

Hyd. No. 38

TOTAL FLOW TO DAM

Hydrograph type	= Combine	Peak discharge	= 195.69 cfs
Storm frequency	= 100 yrs	Time to peak	= 13.70 hrs
Time interval	= 2 min	Hyd. volume	= 4,252,055 cuft
Inflow hyds.	= 23, 25, 27, 32, 37	Contrib. drain. area	= 3.090 ac



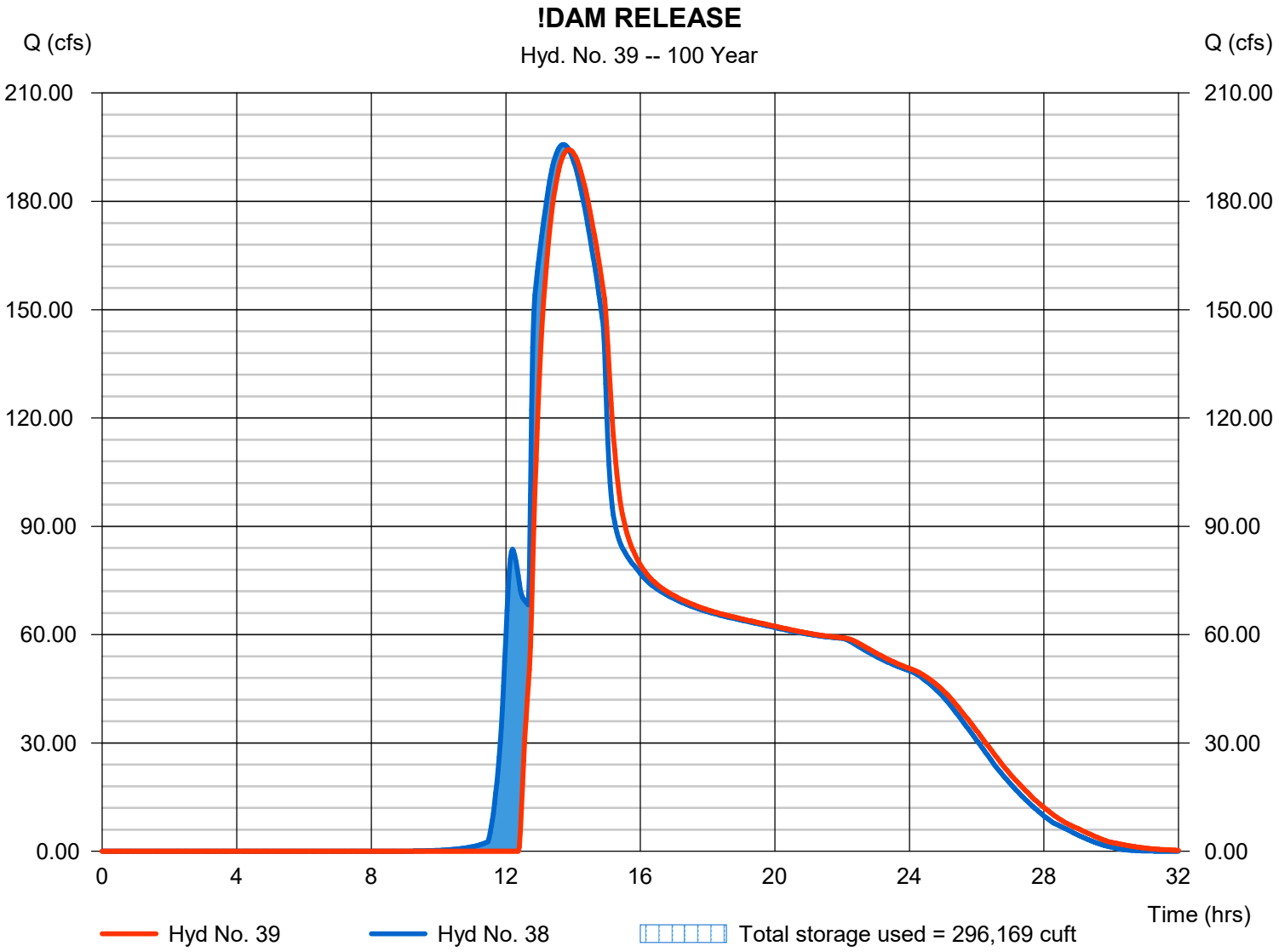
Hydrograph Report

Hyd. No. 39

!DAM RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	194.31 cfs
Storm frequency	=	100 yrs	Time to peak	=	13.87 hrs
Time interval	=	2 min	Hyd. volume	=	4,093,896 cuft
Inflow hyd. No.	=	38 - TOTAL FLOW TO DAM	Max. Elevation	=	943.76 ft
Reservoir name	=	EXISTING DAM	Max. Storage	=	296,169 cuft

Storage Indication method used.

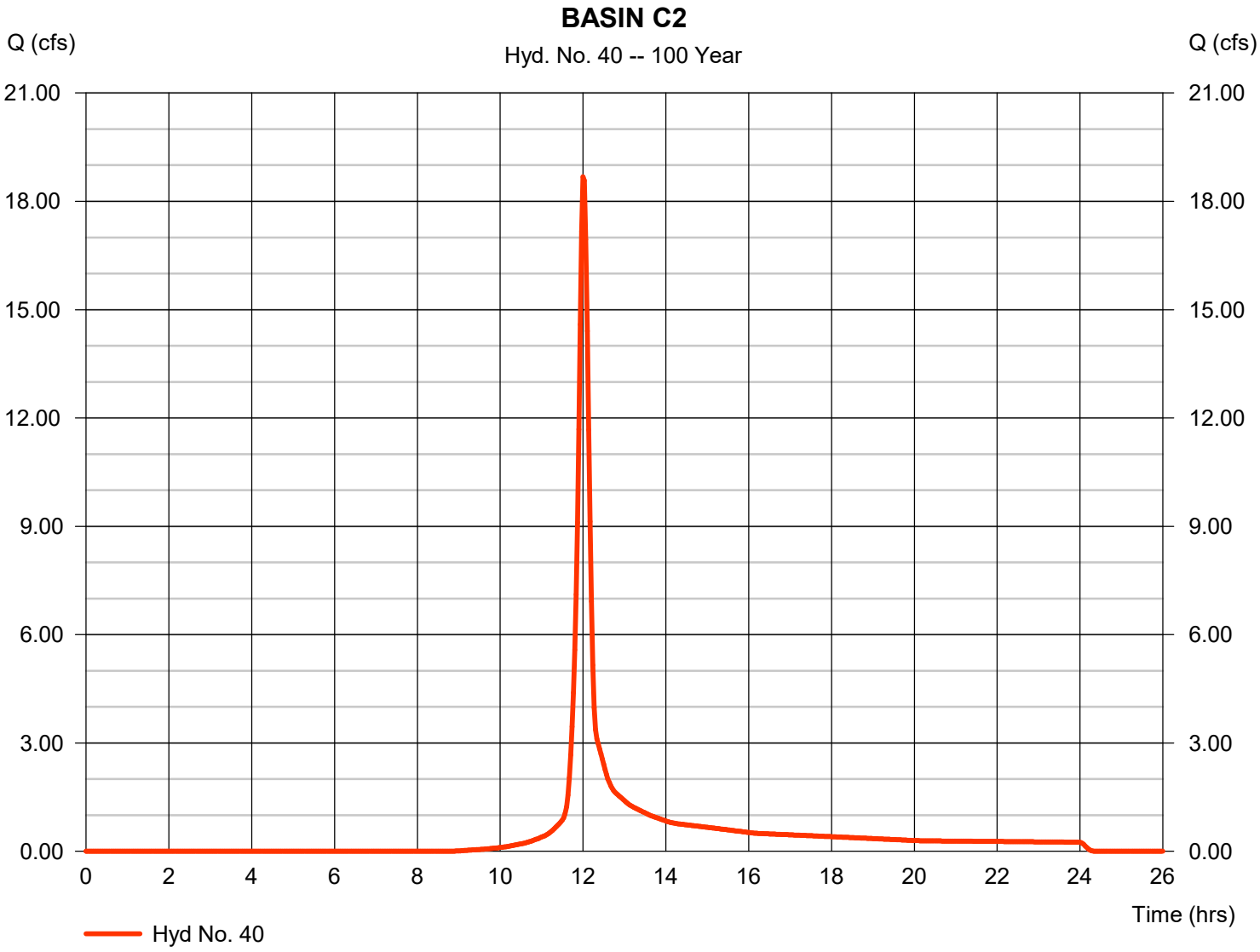


Hydrograph Report

Hyd. No. 40

BASIN C2

Hydrograph type	=	SCS Runoff	Peak discharge	=	18.68 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	48,534 cuft
Drainage area	=	3.810 ac	Curve number	=	67
Basin Slope	=	3.5 %	Hydraulic length	=	457 ft
Tc method	=	LAG	Time of conc. (Tc)	=	13.10 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

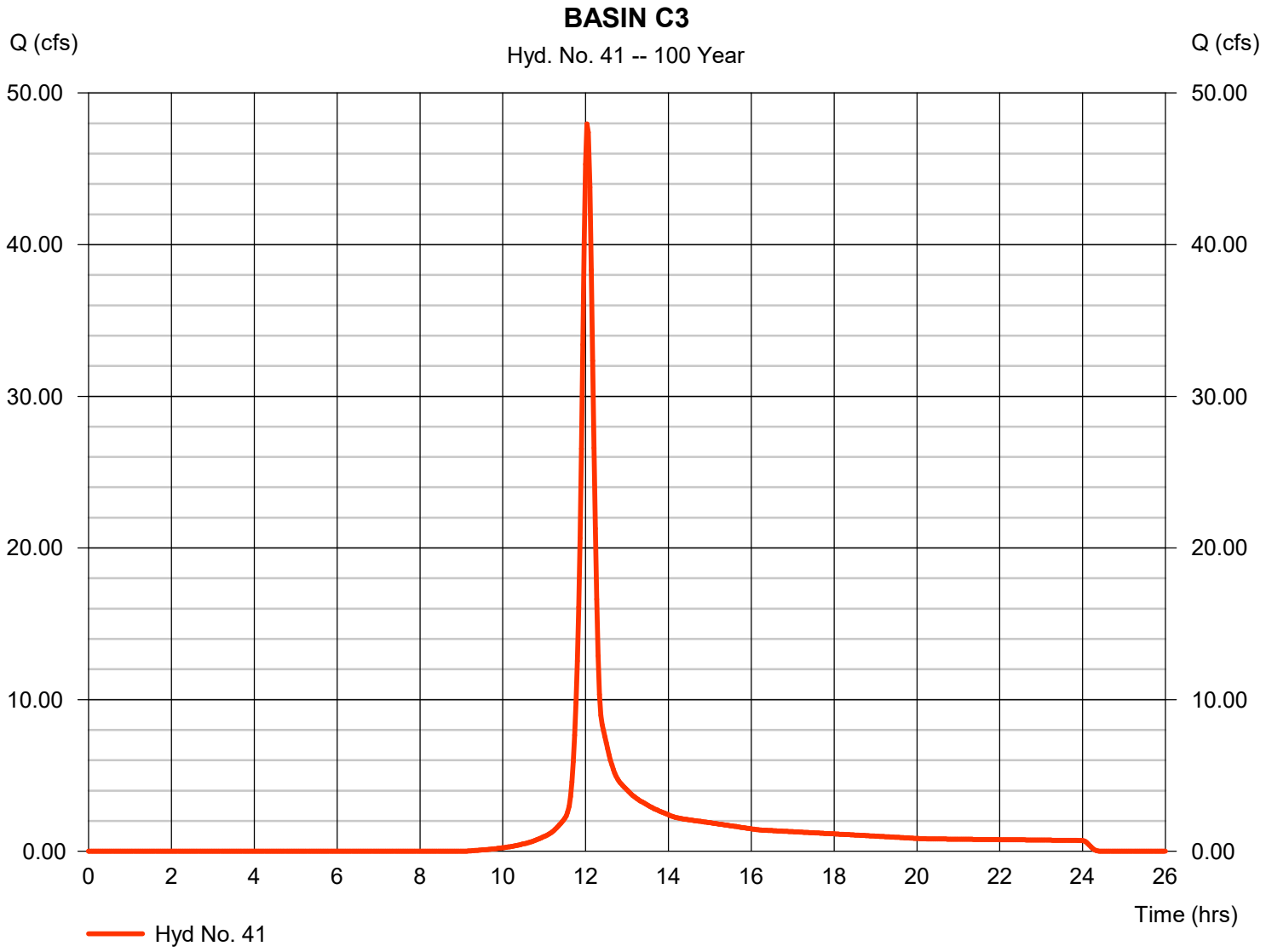


Hydrograph Report

Hyd. No. 41

BASIN C3

Hydrograph type	= SCS Runoff	Peak discharge	= 47.97 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 135,090 cuft
Drainage area	= 11.570 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 7.12 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

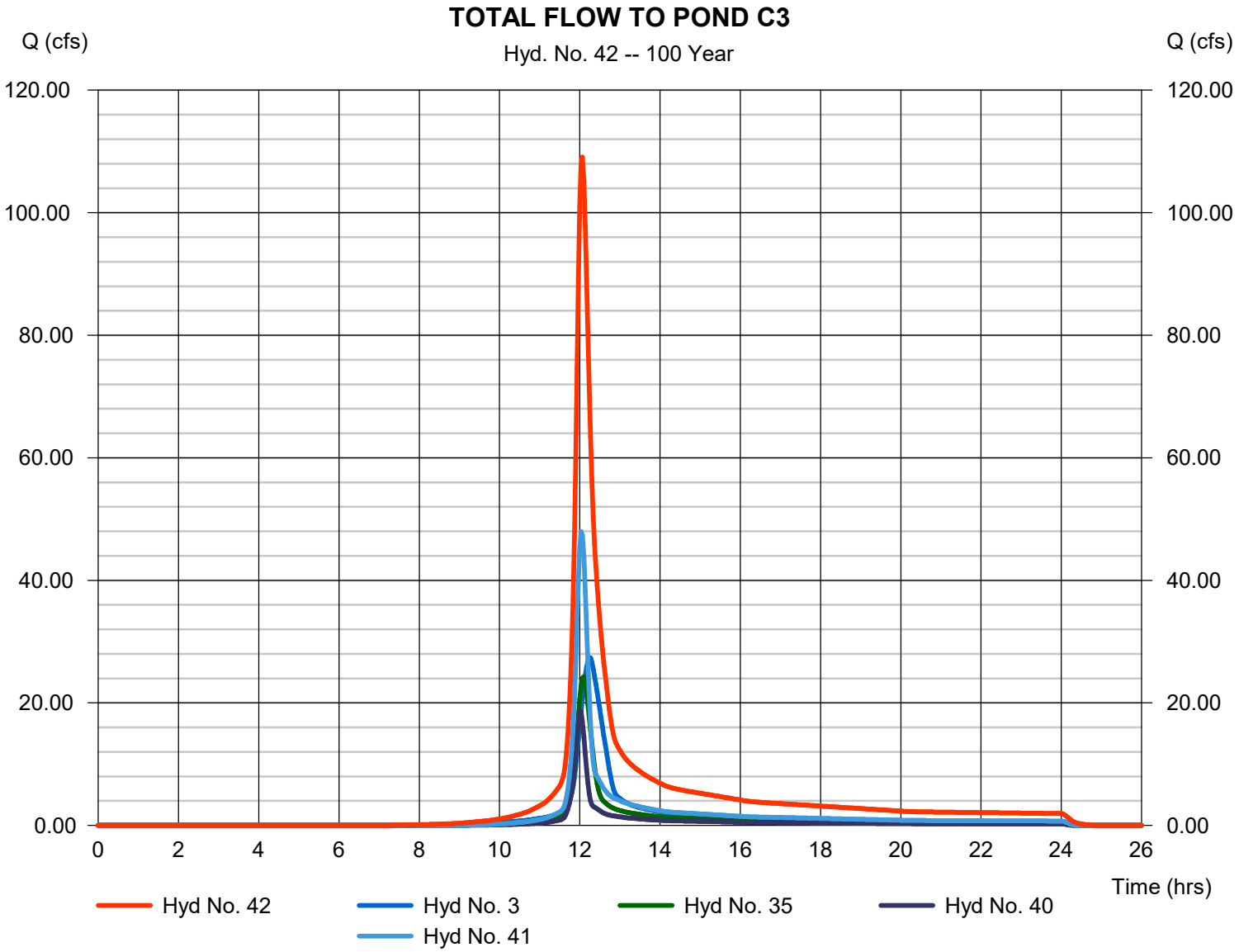


Hydrograph Report

Hyd. No. 42

TOTAL FLOW TO POND C3

Hydrograph type	= Combine	Peak discharge	= 109.07 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 388,812 cuft
Inflow hyds.	= 3, 35, 40, 41	Contrib. drain. area	= 23.520 ac



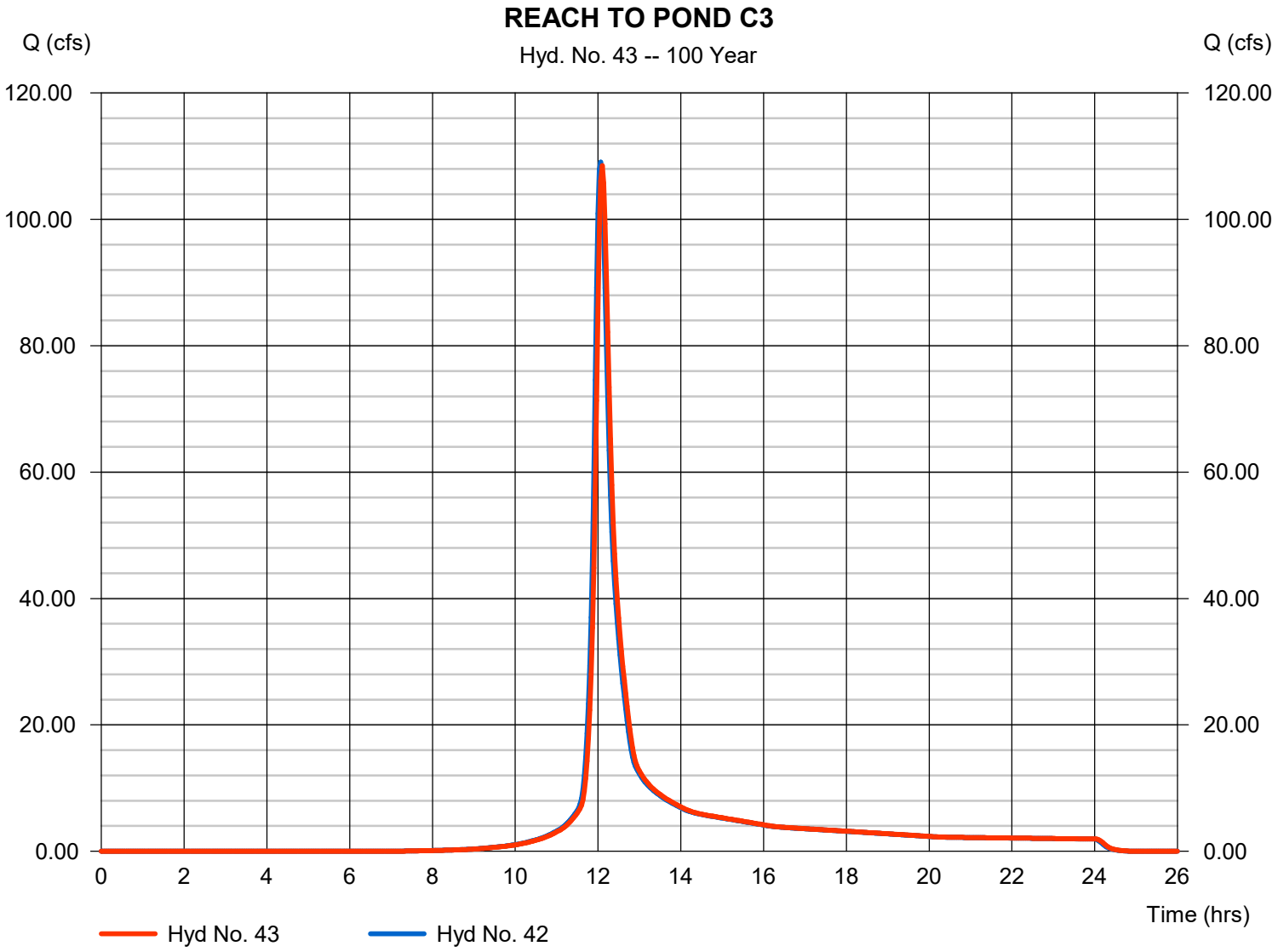
Hydrograph Report

Hyd. No. 43

REACH TO POND C3

Hydrograph type	=	Reach	Peak discharge	=	108.52 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	388,810 cuft
Inflow hyd. No.	=	42 - TOTAL FLOW TO POND C3	Section type	=	Trapezoidal
Reach length	=	450.0 ft	Channel slope	=	1.0 %
Manning's n	=	0.025	Bottom width	=	20.0 ft
Side slope	=	4.0:1	Max. depth	=	5.0 ft
Rating curve x	=	0.808	Rating curve m	=	1.438
Ave. velocity	=	3.60 ft/s	Routing coeff.	=	0.8162

Modified Att-Kin routing method used.

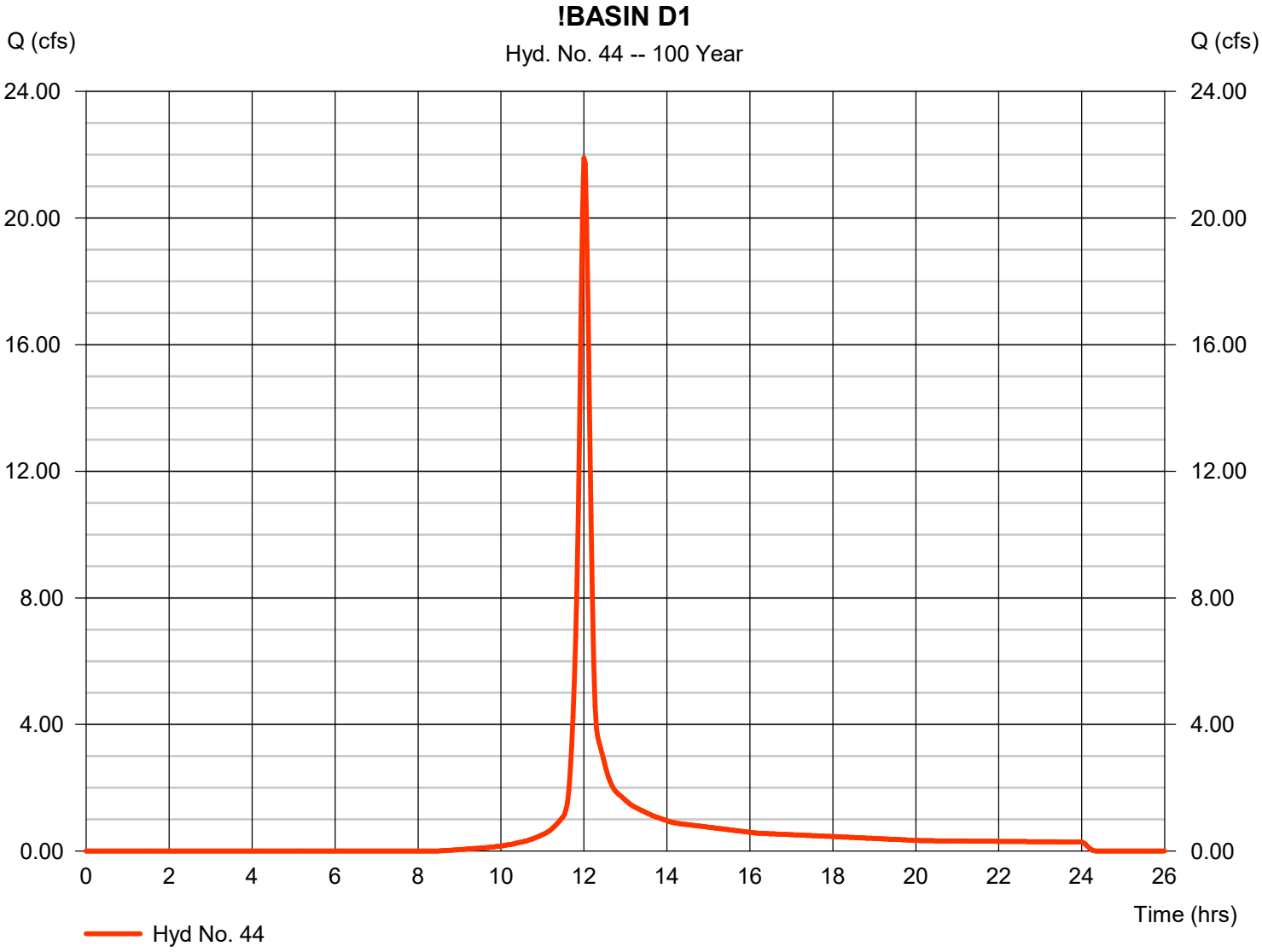


Hydrograph Report

Hyd. No. 44

!BASIN D1

Hydrograph type	= SCS Runoff	Peak discharge	= 21.90 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 56,799 cuft
Drainage area	= 4.200 ac	Curve number	= 69
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 7.12 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

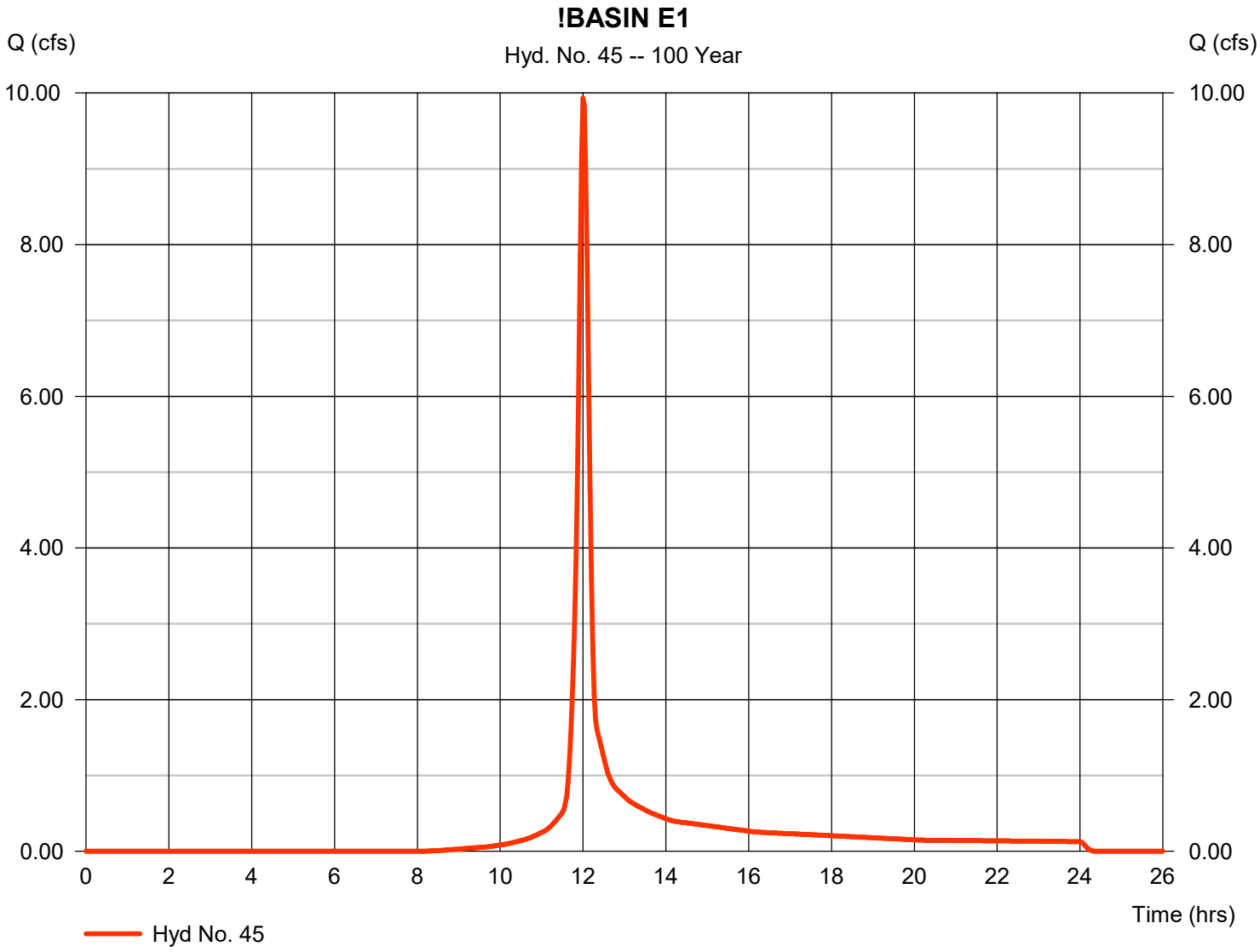


Hydrograph Report

Hyd. No. 45

!BASIN E1

Hydrograph type	=	SCS Runoff	Peak discharge	=	9.933 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	25,751 cuft
Drainage area	=	1.850 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



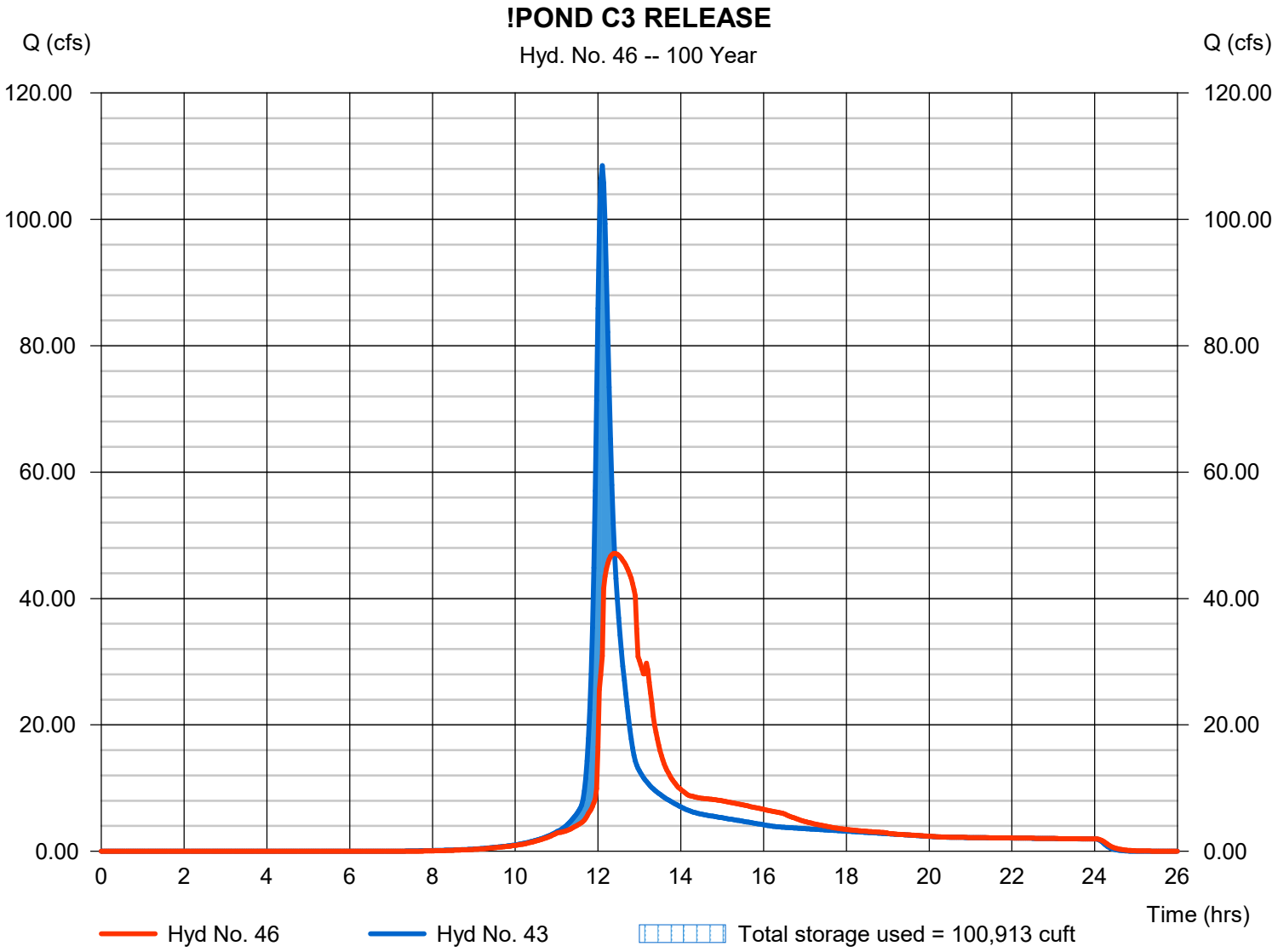
Hydrograph Report

Hyd. No. 46

!POND C3 RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	47.14 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.40 hrs
Time interval	=	2 min	Hyd. volume	=	388,808 cuft
Inflow hyd. No.	=	43 - REACH TO POND C3	Max. Elevation	=	941.49 ft
Reservoir name	=	POND C3	Max. Storage	=	100,913 cuft

Storage Indication method used.

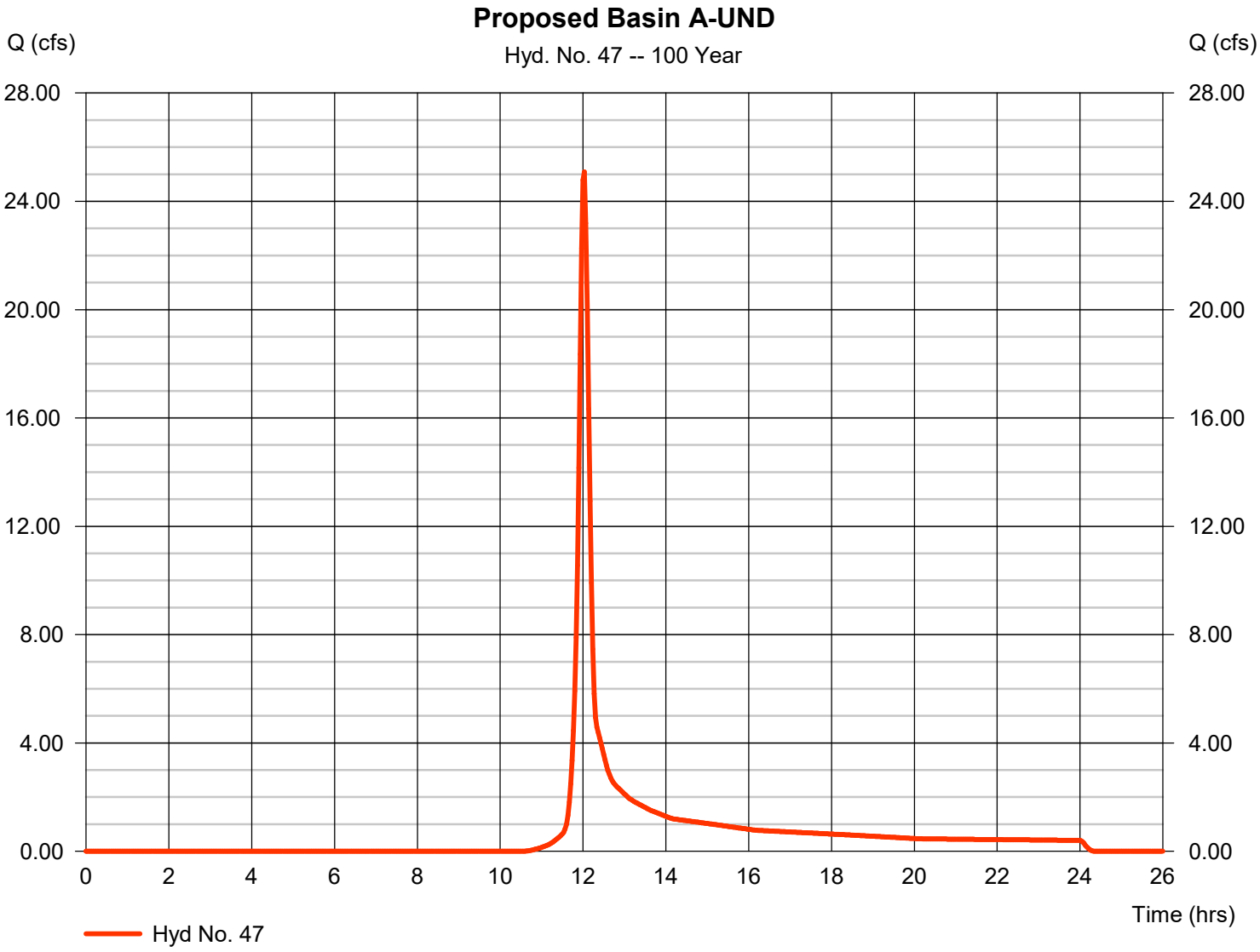


Hydrograph Report

Hyd. No. 47

Proposed Basin A-UND

Hydrograph type	=	SCS Runoff	Peak discharge	=	25.09 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	66,490 cuft
Drainage area	=	7.130 ac	Curve number	=	58
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

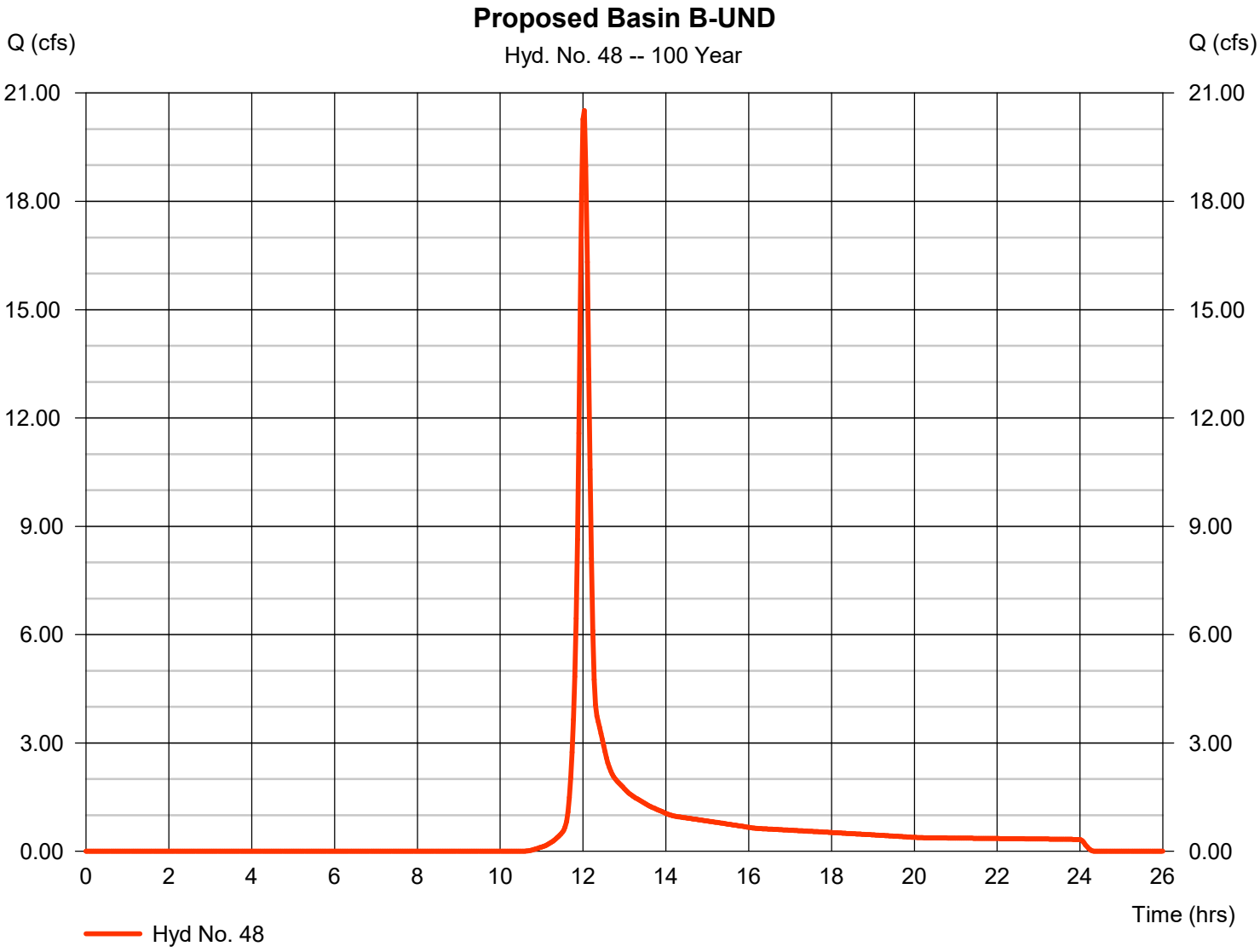


Hydrograph Report

Hyd. No. 48

Proposed Basin B-UND

Hydrograph type	=	SCS Runoff	Peak discharge	=	20.51 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	54,367 cuft
Drainage area	=	5.830 ac	Curve number	=	58
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

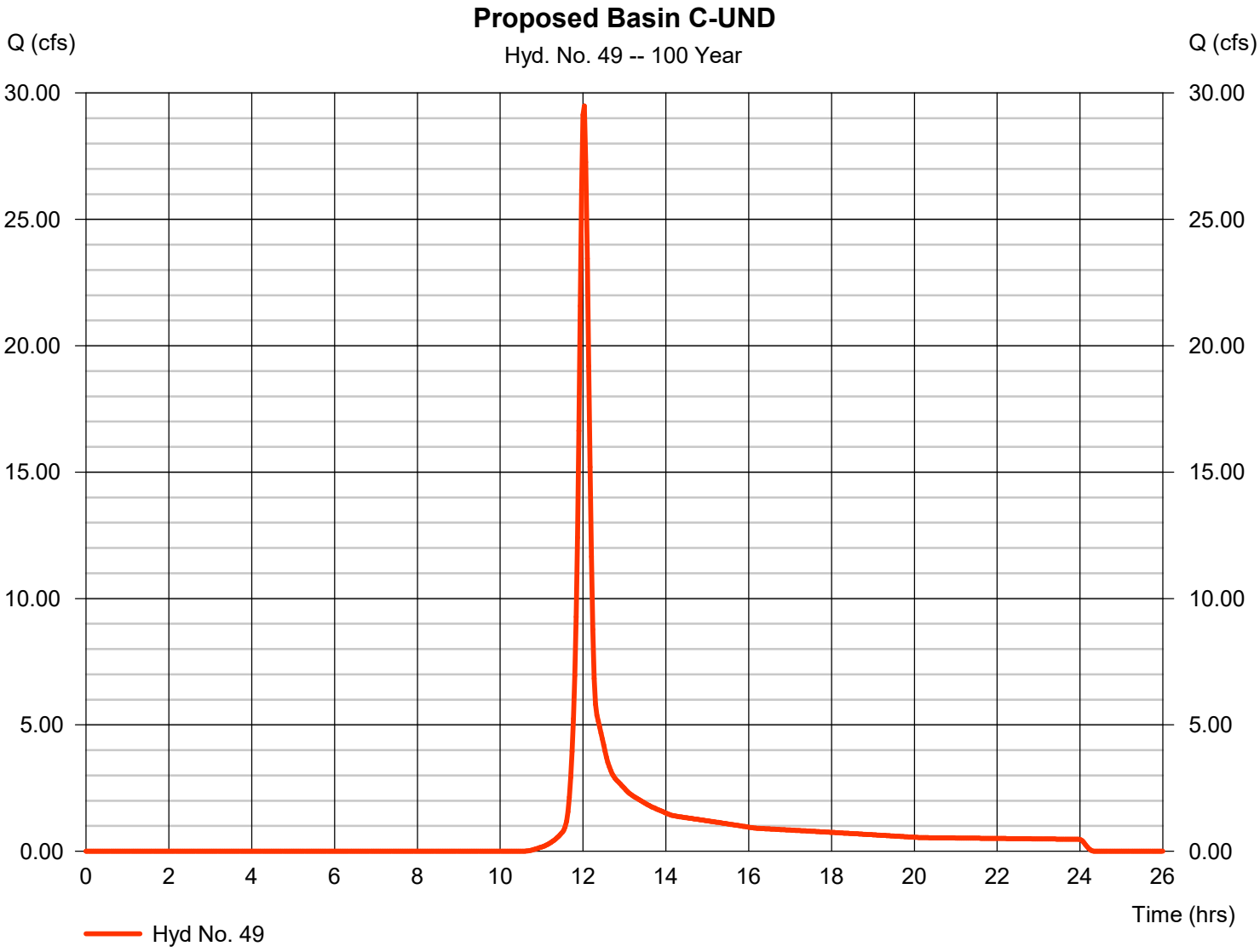


Hydrograph Report

Hyd. No. 49

Proposed Basin C-UND

Hydrograph type	=	SCS Runoff	Peak discharge	=	29.49 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	78,147 cuft
Drainage area	=	8.380 ac	Curve number	=	58
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	7.12 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



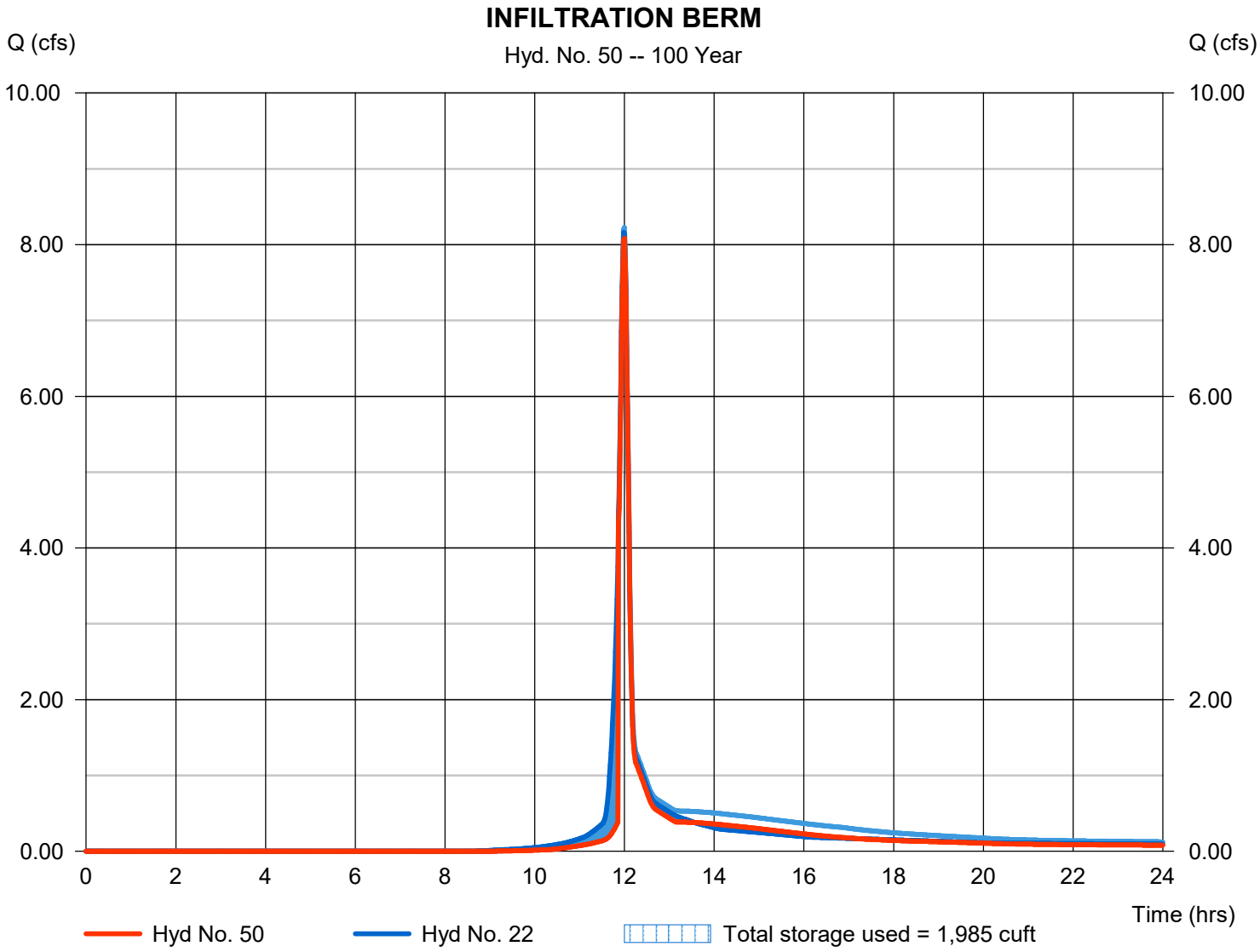
Hydrograph Report

Hyd. No. 50

INFILTRATION BERM

Hydrograph type	=	Reservoir	Peak discharge	=	8.081 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	1 min	Hyd. volume	=	16,431 cuft
Inflow hyd. No.	=	22 - PROPOSED BASIN B (LOTS 10-11)	Max. Elevation	=	946.56 ft
Reservoir name	=	LOT 10 11	Max. Storage	=	1,985 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



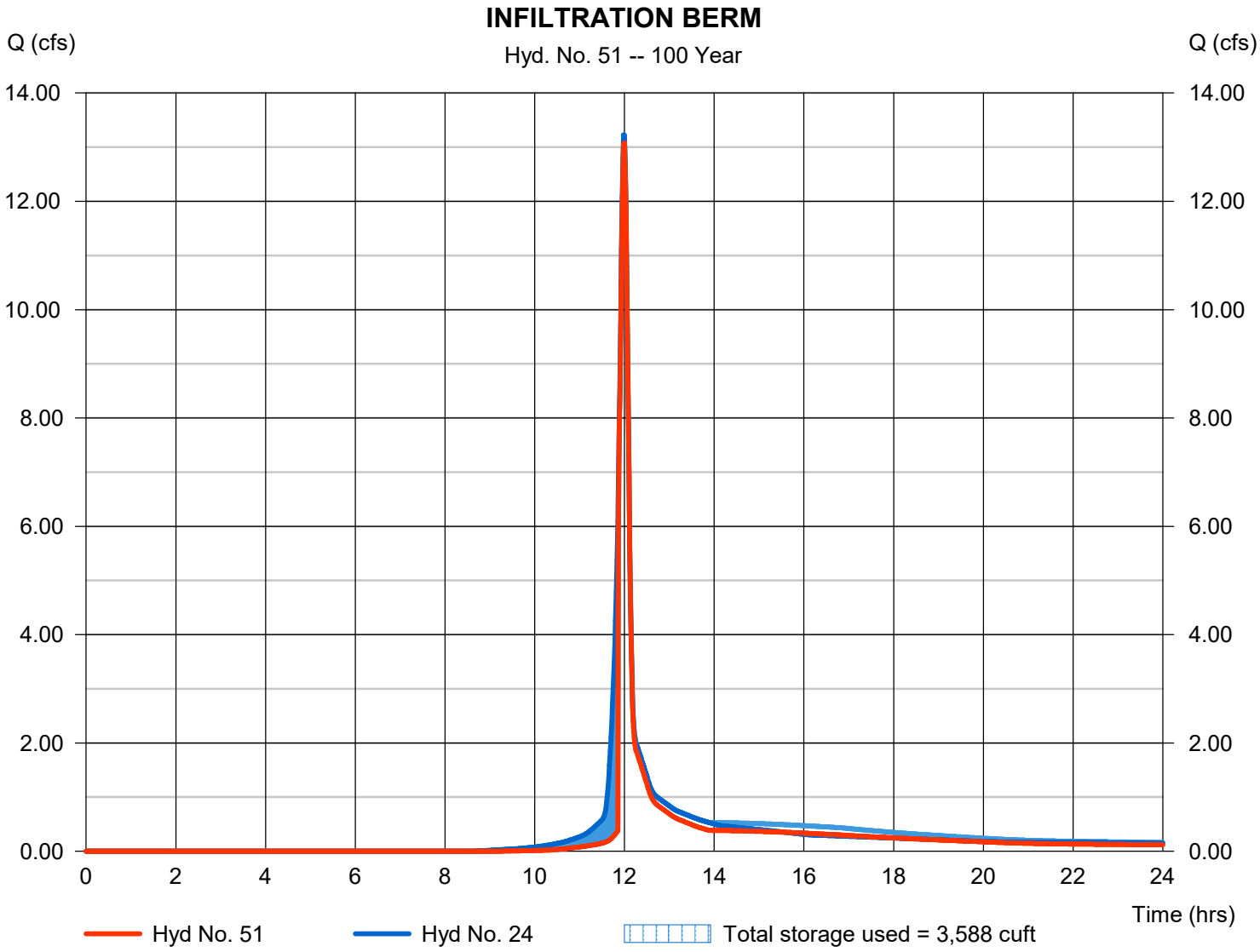
Hydrograph Report

Hyd. No. 51

INFILTRATION BERM

Hydrograph type	=	Reservoir	Peak discharge	=	13.08 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	1 min	Hyd. volume	=	25,027 cuft
Inflow hyd. No.	=	24 - PROPOSED BASIN B (LOTS 51-52)	Max. Elevation	=	941.55 ft
Reservoir name	=	LOT 51 52	Max. Storage	=	3,588 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	24.1705	5.1000	0.7018	--------
2	28.3435	5.1000	0.7022	--------
3	0.0000	0.0000	0.0000	--------
5	35.4692	5.3000	0.7016	--------
10	37.2537	4.6000	0.6755	--------
25	41.3346	4.1000	0.6540	--------
50	42.6141	3.5000	0.6290	--------
100	45.5234	3.3000	0.6151	--------

File name: Region 8.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.77	3.60	2.94	2.52	2.22	1.99	1.81	1.67	1.55	1.45	1.36	1.29
2	5.59	4.21	3.45	2.95	2.60	2.33	2.12	1.95	1.81	1.70	1.60	1.51
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.91	5.23	4.29	3.68	3.24	2.91	2.65	2.44	2.27	2.12	2.00	1.89
10	8.08	6.09	4.99	4.28	3.78	3.40	3.10	2.86	2.67	2.50	2.35	2.23
25	9.75	7.32	6.00	5.16	4.56	4.11	3.76	3.47	3.24	3.04	2.87	2.72
50	11.09	8.29	6.80	5.85	5.18	4.68	4.29	3.97	3.71	3.49	3.30	3.13
100	12.39	9.27	7.62	6.56	5.82	5.27	4.84	4.48	4.19	3.95	3.73	3.55

Tc = time in minutes. Values may exceed 60.

Precip. file name: S:\ELT\Hydraflow Rainfall Data\Region 8\Region 8.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.67	3.08	1.25	3.81	4.46	5.44	6.26	7.12
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	1.69	0.00	2.11	3.90	2.99	6.00	3.83

SECTION 9
Supplemental SWMP Documents

Contents

MAINTENANCE PLAN

The Contractor is required to maintain all temporary erosion control measures in proper working order, including cleaning, repairing, and replacing them as needed throughout construction. Once the project is completed and all permanent cover is established the erosion control measures will be removed. Onsite storm sewers and ponds will require periodic maintenance by the owner. Until the properties are developed it will be the responsibility of the developer to maintain all BMPs. Once construction is complete, it will be the responsibility of the HOA to maintain the detention areas.

Maintenance practices followed by the Contractor during construction of the project are as follows:

1. All control measures shall be inspected every 7 calendar days. Contractor is to verify that all erosion control measures are in proper working order.
2. Inspection reports shall be completed in accordance of the General Permit No. 2.
3. The Contractor/Owner or representative thereof will be responsible for conducting inspections to insure the SWPPP document is be complied with. They will also ensure that water quality and erosion control measures put in place are in proper working order. This person must also have an acceptable level of knowledge regarding equipment and materials used to manage sediment control.

Permanent maintenance conducted post construction by the owner shall include the following:

1. Visual inspection of the site to ensure that no erosion is occurring.
2. Visual inspections of onsite storm sewer during rainfall event to insure they are properly working.
3. Removal of any sediment that has collected in designated storm water detention/ retention areas and remove any debris that may have blocked the outlet orifices.
4. Repair or replacing any damaged structures designed to control storm water runoff, and provided water quality measures for the site.
5. Regularly mow lawn area. No mowing of the native areas.
6. Clear detention facilities of any volunteer trees.
7. Complete annual inspections of detention facilities, and maintain reports for 3 years.

SOIL MANAGEMENT PLAN

EXISTING SITE CONDITIONS

Existing site conditions consist of open lawn. The Soil survey for this site shows that the following soils are present on site:

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
27B	Terril loam, 2 to 6 percent slopes	B	15.2	9.1%
34C	Estherville sandy loam, 2 to 6 percent slopes	A	0.2	0.1%
135	Coland clay loam, 0 to 2 percent slopes, occasionally flooded	C/D	32.3	19.3%
175	Dickinson fine sandy loam, 0 to 2 percent slopes	A	3.0	1.8%
175B	Dickinson fine sandy loam, 2 to 5 percent slopes	A	6.7	4.0%
1585	Spillville-Coland complex, channeled, 0 to 2 percent slopes	B/D	4.7	2.8%
L55	Nicollet loam, 1 to 3 percent slopes	B/D	0.2	0.1%
L62D2	Storden loam, Bemis moraine, 10 to 15 percent slopes, moderately eroded	B	5.8	3.5%
L62E2	Storden loam, Bemis moraine, 10 to 22 percent slopes, moderately eroded	B	42.2	25.3%
L62F	Belview loam, Bemis moraine, 16 to 30 percent slopes	B	7.5	4.5%
L107	Webster clay loam, Bemis moraine, 0 to 2 percent slopes	C/D	13.4	8.1%
L138B	Clarion loam, Bemis moraine, 2 to 6 percent slopes	B	11.7	7.0%
L138C	Clarion loam, Bemis moraine, 6 to 10 percent slopes	B	8.8	5.3%
L138C2	Clarion loam, Bemis moraine, 6 to 10 percent slopes, moderately eroded	B	14.9	8.9%
W	Water		0.2	0.1%
Totals for Area of Interest			**166.9**	**100.0%**

SOIL MANGMENT PLAN

Areas of soil and vegetation disturbances have been outlined in the construction plans. Topsoil stockpile locations and areas of staging have been established to minimize activities detrimental to soil health. Topsoil will be stripped from the site prior to grading and stockpiled on site. The Contractor will follow the best management practices during construction to maintain soil health. In order to improve on site conditions, the contractor will strip the available topsoil from the site and haul it to the stockpile. Once construction is complete topsoil will be hauled back to the site and respread throughout the site. The topsoil will be backfilled loose without compaction.

SOIL QUALITY RESORATION

Soil quality restoration (SQR) will be completed per method 4. The top 8 inches of the surface will be tilled to achieve the desired 40 percent void space in the soil on all lots. No compost will be added as the organic matter is assumed to be 4% per SUDAS. Note that the minimum allowed per ISWMM is 2%.

Site SQR = 289,269 cu-ft (assumed 4%SOM)

Extended Detention also provided in various detention basins.

TOTAL Site WQv = **289,269 cu-ft** vs. Required 85,734 cu-ft

SITE VEGITATION AND COVER

All disturbed areas outside of the residential lots will be seeded with a native grass seed mixture. The ROW will be seeded with Type-2, and the lots will be seeded with a temporary mix consisting of rye grass. Erosion control measures will be left in place until the seed is well established. Seed rates are as follows from tables 9010.06 and 9010.04 from the 2014 SUDAS Standard Specifications.

Table 9010.04: Native Grasses

Common Name	Scientific Name
Big bluestem*	Andropogon gerardii
Blue grama	Bouteloua gracilis
Blue-joint grass	Calamagrostis Canadensis
Bottlebrush sedge	Carex hystericina
Buffalograss*	Buchloe dactyloides
Common rush	Juncus effusus
Fowl bluegrass	Poa palustris
Fowl manna grass	Glyceria striata
Fox sedge	Carex vulpinoidea
Green bulrush	Scirpus atrovirens
Hairy wood chess	Bromus purgans
Indiangrass*	Sorghastrum nutans
Intermediate wheatgrass	Agropyron intermedium
Little bluestem*	Andropogon scoparius
Prairie dropseed	Sporobolus heterolepis
Reed manna grass	Glyceria grandis
Rice cutgrass	Leersia oryzoides
Rye grass, annual	Lolium italicum
Sand bluestem*	Andropogon gerardii, var. paucipilus
Sand dropseed	Sporobolus cryptandrus
Sand lovegrass	Eragrostis trichodes
Sideoats grama*	Bouteloua curtipendula
Slender wheatgrass	Agropyron trachycaulum, var. unilaterale
Spike rush	Eleocharis palustris
Softstem bulrush	Schoenoplectus tabernaemontani
Switchgrass*	Panicum virgatum
Tussock sedge	Carex stricta
Virginia wild-rye	Elymus virginicus
Weeping lovegrass	Eragrostis curvula
Western wheatgrass*	Agropyron smithii
Wool grass	Scirpus cyperinus

Table 9010.06: Type 1 Seed Mixture[1]

Common Name	Application Rate lb/acre
Kentucky bluegrass cultivar[2]	65
Kentucky bluegrass cultivar[2]	65
Kentucky bluegrass cultivar[2]	65
Creeping red fescue	25
Fine-leafed perennial ryegrass[3]	20
Fine-leafed perennial ryegrass[3]	20
Annual ryegrass	40

[1] A commercial mixture may be used if it contains a high percentage of similar bluegrasses; it may or may not contain Creeping Red Fescue.
[2] Choose three different cultivars of Kentucky Bluegrass.
[3] Choose two different cultivars of Fine-Leafed Perennial Ryegrass, at 20 pounds/acre each.